*Faculty of Engineering &Technology*

*P.K. University*

*Shivpuri (MP)*


**Department of Agriculture Engineering**

**Evaluation Scheme & Syllabus of**

**B.Tech -AG**

**First Year I & II Semester**

**(Effective from session 2025-26)**

# EVALUATION SCHEME
# B.TECH - AGRICULTURE ENGINEERING(1st Sem)

## STUDY AND EVALUATION SCHEME FOR B.TECH IN AGRICULTURE ENGINEERING

**YEAR1st/SEMESTER-I**

| SUBJECT CODE | SUBJECTS NAME | STUDY SCHEME Periods/Week | | | Credits | MARKS IN EVALUATION SCHEME | | | | | | Total Marks of Internal & External |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | INTERNAL ASSESSMENT | | | EXTERNAL ASSESSMENT | | | |
| | | L | T | P | | Th | Pr | Tot | Th | Pr | Tot | |
| UENGIAE101 | ENGINEERING MATHEMATICS-I | 3 | 1 | 0 | 4 | 30 | - | 30 | 70 | - | 70 | 100 |
| UENGIAE102 | ENGINEERING PHYSICS | 3 | 1 | 0 | 4 | 30 | - | 30 | 70 | - | 70 | 100 |
| UBASIAE103 | BASIC ELECTRICAL ENGINEERING | 3 | 1 | 0 | 4 | 30 | - | 30 | 70 | - | 70 | 100 |
| UPROFAE104 | PROFESSIONAL COMMUNICATION | 3 | 0 | 0 | 3 | 30 | - | 30 | 70 | - | 70 | 100 |
| UELEMAE105 | ELEMENTARY AGRICULTURE | 3 | 0 | 0 | 3 | 30 | - | 30 | 70 | - | 70 | 100 |
| UENGIAE106 | ENGINEERING PHYSICS LAB | 0 | 0 | 2 | 1 | - | 25 | 25 | - | 25 | 25 | 50 |
| UBASIAE107 | BASIC ELECTRICAL ENGINEERING LAB | 0 | 0 | 2 | 1 | - | 25 | 25 | - | 25 | 25 | 50 |
| UPROFAE108 | PROFESSIONAL COMMUNICATION LAB | 0 | 0 | 2 | 1 | - | 25 | 25 | - | 25 | 25 | 50 |
| Total | | 15 | 3 | 6 | 21 | 150 | 75 | 225 | 350 | 75 | 425 | 650 |

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# UENGIAE101:ENGINEERING MATHEMATICS-I

**Unit-1:Statistical Technique:**

- Introduction.
- Measures of central tendency: Mean median &mode.
- Mean deviation.
- Standard deviation.
- Skewness.
- Karl Pearson's coefficient of skewness.
- Principle of Least square.

**Unit-2:Elementary Differentiation:**

- Definition.
- Limit and continuity.
- Derivatives of some standard functions.
- Derivatives of sum and difference.
- Derivatives of product and quotient of functions.
- Derivatives of composite functions and chainrule.
- Logarithmic differentiation.
- Parametric differentiation

**Unit-3:Taylor's and Maclaurin's series for one variable(without proof).**

- Indeterminate forms
- Curvature: Cartesian formula for radius of curvature.
- Asymptotes for Cartesian coordinates only.

**Functions of two or more independent variables:**

- Partial differentiation.
- Homogeneous functions and Euler's theorem.
- Total differentiation and Change of variables.
- Jacobians.
- Maxima and minima(simple problems only).

**Unit-4:Elementary Integration:**

- Integration as inverse process of differentiation.
- Integration of some standard functions.
- Integration by substitution.
- Integration by parts.
- Integration by partial fraction.

**Unit-5:Ordinary differential equations of first order and first degree:**

- Exact differential equations.
- Equations reducible to exact form by integrating factors.

**Linear differential equation**

- Bernoulli's differential equations. Linear differential equations of higher orders with constant coefficients.
- Complementary functions
- Particular integrals.

Method of variation of parameters (second order only)Simultaneous linear differential equations with constant coefficients

**Text Books:**


1. Mathematics part-I, textbook for class XII, NCERT publications 2012.
2. Mathematics part-II, textbook for classXII,NCERTpublications2012.
3. H.K. Dass and Rama Verma , Introduction to engineering mathematics-I S ChandPublication,2012.
4. B.V.Ramana, Higher Engineering Mathematics. Tata McGraw-Hill Publishing Company Ltd.2009


**Reference books:**


1. E.Kreyszig ,Advance Engineering Mathematics. John Wiley&Sons,2005.
2. B.S. Grewal, Higher Engineering Mathematics .Khanna Publisher,2005.
3. PeterV.O'Neil, Advance Engineering Mathematics. Thomson (Cengage) Learning,2007.

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## UENGIAL102:ENGINEERING PHYSICS

| Unit | Topic | Lectures |
|---|---|---|
| 1 | **Surface tension**<br>➢ Angle of contact<br>➢ Excess of pressure inside a spherical surface<br>➢ Capillary rise<br>➢ Jager's method surface tension determination<br>**Viscosity**<br>➢ Streamline motion<br>➢ Turbulent motion<br>➢ Coefficient of viscosity<br>➢ Critical velocity<br>➢ Poiseuille's equation & Viscometer | 8 |
| 2 | **Optics Interference**<br>➢ Principle of superposition<br>➢ Types of interference<br>➢ Young's experiment<br>➢ Determination of thickness of thin sheets<br>➢ Thin films testing<br>➢ Young's double slit experiment<br>➢ Coherent sources<br>**Diffraction**<br>➢ Definition of diffraction<br>➢ Types of diffraction<br>➢ Fraunhoffer diffraction single slit<br>➢ Diffraction double slit<br>➢ Diffraction grating<br>➢ Resolving & dispersive power of grating | 10 |

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| **3** | **Polarisation**<br>➢ Polarization<br>➢ Plane of polarization<br>➢ Brewesters law<br>➢ Malus law<br>➢ Detection of circularly & elliptically polarized light<br>➢ Quarter and half wave plate<br>➢ Specific rotation and strength of sugar solution.<br>**Lasers**<br>➢ Spontaneous and stimulated emission<br>➢ Einstein A& B coefficient<br>➢ Population inversion<br>➢ He-Ne & ruby lasers. | **8** |
| **4** | **Magnetic properties of materials:-introduction**<br>➢ Para, dia& ferromagnetism<br>➢ Lange vinus theory<br>➢ Hysteresis loss<br>➢ Quantum theory<br>➢ Heisenberg uncertainty principle<br>➢ Wavefunction<br>➢ De-broglie waves<br>➢ Schrodinger wave equation.<br>**Electronics**<br>➢ Distinction between metals<br>➢ Insulators & semiconductors Intrinsic &extrinsic semiconductor<br>➢ Determination of energy gap in semiconductors. | **10** |

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## UENGIAL106:ENGINEERING PHYSICS LAB

## List of Experiments:

**Any ten experiments:**

(a) To find the frequency of A.C. supply using an electrical vibrator;

(b) To find the low resistance using Carey Foster bridge without calibrating the bridge wire;

(c) To determine dielectric constant of material using De Sauty's bridge;

(d) To determine the value of specific charge (e/m) for electrons by helical method;

(e) To study the induced e.m.f. as a function of velocity of the magnet;

(f) To obtain hysteresis curve (B-H curve) on a C.R.O. and to determine related magnetic quantities;

(g) To study the variation of magnetic field with distance along the axis of a current carrying circular coil and to detuning the radius of the coil;

(h) To determine the energy band gap in a semiconductor using a p-n Junction diode;

(i) To determine the slit width from Fraunhofer diffraction pattern using laser beam;

(j) To find the numerical aperture of optical fibre:

(k) To set up the fibre optic analog and digital link;

(i) To study the phase relationships in L.R. circuit; to study LCR circuit;

(j) To study the variations of thermo emf of a copper-constantan thermo-couple with temperature;

(k) To find the wave length of light by prism.

**Suggested Reading:**

Brijlal and Subrahmanyam. Text Book of optics. S. Chand and Co., New Delhi.

Sarkar Subir Kumar. Optical State Physics and Fiber Optics. S. Chand and Co., New Delhi. Gupta S L, Kumar V Sharma R C. Elements of Spectroscopy. Pragati Prakasam, Meeruth. Saxena B S and Gupta R C. Solid State Physics. Pragati Prakasam, Meeruth.

Srivastava B N. Essentials of Quantum Mechanics. Pragati Prakasam, Meeruth.

Vasudeva D N. Fundamentals of Magnetism and Electricity. S. Chand and Co., New Delhi

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## UBASIAE103: BASIC ELECTRICALENGINEERING

### Unit-I:D-C CIRCUITANALYSIS:

Circuit concept: concept of network, active and passive elements, voltage and current source, concept of linearity and linear network, unilateral and by lateral elements, R,L,C as linear element Kirchhoff's low, star delta transformation

### Unit-II: Steady state analysis of single phase AC

Ac fundamentals: sinusoidal wave form –average and effective value, form and peak factor, analysis of series, parallel and series parallel RLC circuit, active, reactive and apparent power ,power factor

### Unit-III: Three phase AC circuit

Three phase system–its necessity and advantages, star and delta connections, phase sequence, balance supply and balance load, line phase voltage /current relation.

### Unit-IV: Magnetic circuit

Magnetic circuit concept, analogy between electric and magnetic circuits ,Force acting on current carrying conductor in magnetic circuit, magnetic force due to electric current, statically and dynamically induced emf, B-H curve, Hysteresis and eddy current losses

Single Phase Transformer: Principle of operation, construction, EMF equation, Equivalent circuit, power loss Efficiency.

### Unit-V:Electrical Machines:

Concept of electro- mechanical energy conversion

DC Machines: Types, EMF equation of generator and torque equation of motor ,application
Three Phase Induction Motor: Types, principle of operation, Application Three Phase Synchronous Machines: Principle of operation of alternator and synchronous motor and their applications.

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## UBASIAL107:BASIC ELECTRICAL ENGINEERING LAB

**LIST OF EXPERIMENTS:**

Note: A minimum often experiments from the following should be performed

(a) To obtain load characteristics of D.C. shunt/series /compound generator;

(b) To study characteristics of DC shunt/ series motors;

(c) To study D.C. motor starters;

(d) To perform load-test on 3 ph. induction motor & to plot torque V/S speed characteristics;

(e) To perform no-load & blocked –rotor tests on 3 ph. Induction motor to obtain equivalent ckt. Parameters & to draw circle diagram;

(f) To study the speed control of 3 ph. induction motor by cascading of two induction motors, i.e. by feeding the slip power of one motor into the other motor;

(g) To study star- delta starters physically and (a) to draw electrical connection diagram (b) to start the 3 ph. induction motor using it. (c) to reverse the direction of 3 ph. I.M.;

(h) To start a 3-phase slip –ring induction motor by inserting different levels of resistance in the rotor ckt. And to plot torque –speed characteristics;

(i) To perform no load & blocked –rotor test on 1 ph. induction motor & to determine the parameters of equivalent ckt. Drawn on the basis of double revolving field theory;

(j) To perform load –test on 1 ph. induction motor & plot torque –speed characteristics;

(k) To study power consumed in a three-phase circuit; Two lights in series controlled by one switch; Two lights in parallel controlled by one switch.

**Suggested Reading:**


Thareja B L & Theraja AK. 2005. A text book of Electrical Technology. Vol. I S. Chand & Company LTD., New Delhi.

Theraja B L & Theraja AK 2005. A text book of Electrical Technology. Vol. II S.Chand & Company LTD., New Delhi.

Vincent Del Toro. 2000. Electrical Engineering Fundamentals. Prentice-Hall of India Private LTD., New Delhi.

Anwani M L. 1997. Basic Electrical Engineering. Dhanpat Rai & Co.(P) LTD. New Delhi.

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## UPROFAE104:PROFESSIONAL COMMUNICATION

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| **Unit-1 Fundamentals of Communications** | Technical Communication: features: Distinction between General And Technical Communication; Language as a tool of communications; Levels of communication: Interpersonal, Organizational, Mass communication; The flow of communication: Downward, Upward, Lateral/Horizontal (Peer group) : Importance of technical communication; Barriers to Communication. |
| **Unit-II Written Communication** | Words and Phrases: Word formation, Synonyms and Antonyms; Homophones; Select vocabulary of about 500-1000 New words; correct Usage: all Parts of Speech; Modals; Concord; Articles; Infinitives; Transformation of sentences; Requisites f Sentence Construction: Paragraph Development: Techniques and Methods-Inductive, Deductive, Spatial , Linear, Chronological etc. |
| **Unit-III Business Communication** | Principles, Sales & Credit letters; Claim and Adjustment Letters ;Job Application and Resumes. Reports: Types; Significance; Structure, Style & Writing of Reports. Technical Proposal; Parts; Types; Writing of Proposal; Significance; Negotiation skills. |
| **Unit-IV Presentation Strategies and Soft Skills.** | Nuances and Modes of Delivery; Body Language; Dimensions of Speech: Syllable; Accent; Pitch; Rhythm; Intonation; Paralinguistic features of voice; Interpersonal communication: Definition; Types ;Team work; Attitude; Way to improve Attitude Listening Skills : Types; Methods for improving Listening Skills. |
| **Unit –V Value-Based Text Readings** | Following essays from the prescribed textbook with emphasis on Mechanics of writing.<br>**(d)**Humanistic and Scientific Approaches to Human Activity by Moody E .Prior<br>**(ii)** The Language of Literature and Science by A.Huxley<br>**(iii)** Man and Nature by J.Bronowski<br>**(iv)** Science and Survival by Barry Commoner<br>**(v)** The Mother of the Sciences by A. J. Bahm. |

**Text Book**

1.Improve your Writinged. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, 2001, New Delhi.
2. Technical Communication-Principles and Practices by Meenakshi Raman &Sangeeta Sharma, Oxford Univ. Press, 2007, New Delhi.
3. Functional skills in Language and Literature, by R.P.Singh, Oxford Univ. Press, 2005, New Delhi.

**Reference Books:**

1. Communication Skills for Engineers and Scientists, Sangeeta Sharma et.al. PHI Learning Pvt. Ltd, 2011, New Delhi.
2. Business Correspondence and Report Writing by Prof .R.C., Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd. , 2001, New Delhi.
3. Word Power Made Easy by Norman Lewis, W.R. Goyal Pub .& Distributors, 2009, Delhi.

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## UPROFAE108:PROFESSIONAL COMMUNICATION LAB

## LABORATORY PRACTICAL'S

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

### LIST OF PRACTICAL'S

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

**Reference Books:**


1. Bansal R.K.& Harrison: Phoneticsin English, Orient Longman, New Delhi.
2. Sethi&Dhamija:ACourseinPhoneticsandSpokenEnglish,PrenticeHall,New Delhi.
3. L.U.B.Pandey&R.P.Singh,AManualofPracticalCommunication,A.I.T.B.S.Pub.IndiaLtd. Krishan Nagar, Delhi.
4. Joans Daniel, English Pronouncing Dictionary, Cambridge Univ. Press.

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## UELEMAE105:ELEMENTARY AGRICULTURE

**UNIT-1**

Introduction to soils ,Soil Characteristics, Nature and origin of soil, Soil forming rocks and minerals, their classification and composition, Soil forming processes, Classification of soils, Soil taxonomy orders ,Important soil physical properties; and their importance, Soil particle distribution, Soil inorganic colloids – their composition, Properties and origin of charge , Ion exchange in soil and nutrient availability;

**UNIT-II**

Soil Organic Matter-Its composition and decomposition, effect on soil fertility, Soil reaction – acid, saline and sodic soils, Quality or irrigation water, Essential plants nutrients**.** Functions and deficiency symptoms in plants, important inorganic fertilizers and their reactions in soils. Use of saline and sodic water for crop production, Gypsum requirement for reclamation of sodic soils and neutralising RSC; Liquid fertilisers and their solubility and compatibility.

**UNIT-III**

Definition and scope of agronomy ,Classification of crops, Effect of different weather parameters on crop growth and development ,Principles of tillage, tilth and its characteristics, Soil water plant relationship and water requirement of crops, Crop rotation ,Cropping systems ,Relay cropping ,Mixed cropping, Organic farming-Sustainable agriculture. Soil water plant relationship, crop coefficients, cropping scheme and pattern, water requirement of crops and critical stages for irrigation.

**UNIT-IV**

Scope of horticultural and vegetable crops, Soil and climatic requirements for fruits, Soil and climatic requirements for Vegetables, Soil and climatic requirements for Floriculture crops, Improved varieties of horticulture crops, High-tech horticulture- Polyhouses for flowers and vegetables (in-brief), seed rate and seed treatment for vegetable crops; macro and micro propagation methods, plant growing structures, pruning and training, Extraction and storage of vegetables seeds. Major pests and diseases and their management in horticulture crops.

**UNIT-V**

layout and planting methods , Nursery raising, Harvesting, Grading and packaging , Post harvest practices , Garden tools, management of orchard , Extraction and storage of vegetables seeds.
Introduction of soil mechanics, field of soil mechanics.

**Text books:**

1. T D Biswas, S K Mukherjee ‘Soil Science’ –TMH Publication
2. T. Yellamanda Reddy, G.H Sankara Reddy ‘Principle of Agronomy’ - Kalyani Publication
3. Jitendra Singh ‘Basic Horticulture’.Kalyani Publishers

**Reference Material:**

1. Mehta. K. K. Reclamation of Alkali Soil in India, Oxford & IBH Publication
2. Maharaj Singh. Education for Sustainable Agriculture. Indian J. Agron

# EVALUATION SCHEME
# B.TECH - AGRICULTURE ENGINEERING(2nd Sem)

**STUDY AND EVALUATION SCHEME FOR B.TECH IN AGRICULTURE ENGINEERING**

**YEAR1st/SEMESTER-II**

| SUBJECT CODE | SUBJECTS NAME | STUDY SCHEME Periods/Week | | | Credits | MARKS IN EVALUATION SCHEME | | | | | | Total Marks of Internal &External |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | INTERNAL ASSESSMENT | | | EXTERNAL ASSESSMENT | | | |
| | | L | T | P | | Th | Pr | Tot | Th | Pr | Tot | |
| UENGIAE201 | ENGINEERING MATHEMATICS-II | 3 | 1 | 0 | 4 | 30 | - | 30 | 70 | - | 70 | 100 |
| UENGIAE202 | ENGINEERING CHEMISTRY | 3 | 1 | 0 | 4 | 30 | - | 30 | 70 | - | 70 | 100 |
| UELEMAE203 | ELEMENTS OF MECHANICAL ENGG | 3 | 1 | 0 | 4 | 30 | - | 30 | 70 | - | 70 | 100 |
| UFUNDAE204 | FUNDAMENTAL OF COMPUTER PROGRAMMING | 3 | 0 | 0 | 3 | 30 | - | 30 | 70 | - | 70 | 100 |
| USURVAE205 | SURVEYING & LEVELING | 3 | 0 | 0 | 3 | 30 | - | 30 | 70 | - | 70 | 100 |
| UELEMAE206 | ELEMENTS OF MECHANICAL ENGG LAB | 0 | 0 | 2 | 1 | - | 25 | 25 | - | 25 | 25 | 50 |
| UFUNDAE207 | FUNDAMENTAL OF COMPUTER PROGRAMMING LAB | 0 | 0 | 2 | 1 | - | 25 | 25 | - | 25 | 25 | 50 |
| USURVAE208 | SURVEYING & LEVELING LAB | 0 | 0 | 2 | 1 | - | 25 | 25 | - | 25 | 25 | 50 |
| Total | | 15 | 3 | 6 | 21 | 150 | 75 | 225 | 350 | 75 | 425 | 650 |

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## UENGIAE201: ENGINEERING MATHEMATICS-II

| Unit | Topic | Lectures |
|---|---|---|
| 1 | **Matrices:**<br>➢ Definition & types matrices.<br>➢ Elementary transformations.<br>➢ Rank of a matrix.<br>➢ Reduction to normal form and triangular form.<br>➢ Inverse of a matrix.<br>➢ Consistency and solution of linear equations.<br>➢ Eigen values.<br>➢ Cayley-Hamilton theorem (without proof).<br>➢ Eigen vectors.<br>➢ Diagonalisation of matrices. | 9 |
| 2 | **Functions of Complex variable:**<br>➢ Limit continuity & differentiability.<br>➢ Analytic function & Cauchy-Riemann equations (Cartesian form).<br>➢ Harmonic function.<br>➢ Conjugate function.<br>➢ Milne Thomson method. | 9 |
| 3 | **Vector Calculus:**<br>➢ Differentiation of vectors.<br>➢ Scalar & vector point functions, vector differential operator Del.<br>➢ Gradient of a scalar function & their geometrical meaning.<br>➢ Normal & Directional derivative.<br>➢ Divergence of a vector function and their physical interpretation.<br>➢ Curl of a vector function & their physical meaning.<br>➢ Line integral.<br>➢ Surface integral.<br>➢ Volume integral- illustrative examples.<br>➢ Green's theorem (for a plane)<br>➢ Stoke's theorem- illustrative examples*.<br>➢ Gauss's theorem- illustrative examples* | 9 |

| | | |
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| | **Note: In case of illustrative examples*, question are not to be set.** | |
| **4** | **Fourier series & Partial differential equation:**<br><br>➢ Periodic functions.<br>➢ Fourier series &Dirichlet's conditions.<br>➢ Fourier series of period 2π and Euler's formulae.<br>➢ Even function & odd function.<br>➢ Half range series (Period π).<br>➢ Fourier series of functions having arbitrary period (Period 2c).<br>➢ Half range, series (arbitrary period).<br>➢ Introduction & formation of partial differentiate equation.<br>➢ Linear partial differentiate equation with constant coefficient.<br>➢ Non-homogeneous linear equations. | **9** |
| **5** | **Application of partial differential equation:**<br><br>➢ Introduction & Method of separation of variables.<br>➢ One dimensional wave equation (without proof) and problems.<br>➢ One dimensional heat equation (without proof) and problems.<br>➢ Two dimensional steady state heat flow equation (without proof) & problems. | **9** |

**Text books:**


1. H.K. Dass&RajnishVerma, Higher Engg. Mathematics. S. Chand & Company Ltd., 2012
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Ltd. 2008.


**Reference books:**


1. B.S. Grewal, Higher Engineering Mathematics. Khanna Publisher, 2005.
2. E.Kreyszig, Advance Engineering Mathematics. John Wiley & Sons, 2005.
3. Peter V. O'Neil, Advance Engineering Mathematics. Thomson (Cengage) Learning, 2007.

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## UENGIAE202: ENGINEERING CHEMISTRY

**UNIT 1**

Introduction to water: Temporary and permanent hardness, Zeolite process, Lime soda process Disadvantage of hard water, Scale and sludge formation in boilers, Boiler corrosion.
Chemical fuels: Classification of fuels, Calorific value, Advantage of Solid, liquid and gaseous fuel, Octane number

**UNIT 2**

Corrosion: Cause, Types, Methods of prevention-pitting and stress corrosion, Alloying, protective coating- metallic, inorganic and organic
Lubricants: Properties, Mechanism, Classification and Tests, Viscosity and Viscosity Index Flash and Fire point, Cloud and Pour Point

**UNIT 3**

Polymers: Types of polymerization, Properties, Use and methods for the determination of molecular weight of polymers.
Electro-chemistry: Specific molecular conductivity, Equivalent conductivity, Determination of conductivity, E.M.F and its measurements, Polarization, Voltage.

**UNIT 4**

Chemical Kinetics : Order and molecularity of reaction, First and second order reaction, Derivations of equation for first order and second order ,Determination of order of reaction Energy of activation ,Arrhenius equation ,Numerical of first and second order reactions.
Cement: Manufacture of Portland cement, chemistry of setting and hardening.

**Text books:**

1. Engg Chemistry by P.C Jain & Monika Jain, Publication Jain Brothers.
2. Fundamental of Biochemistry by A.C. Deb, Publication New Central Book Agency P Ltd.

**Reference Material:**

**1.** Engg Chemistry by Mani & Mishra, Publication Cengage Learning India Pvt Ltd.
**2.** Principle of Food Chemistry by John M. DeMan, an Aspen Publication.

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## UELEMAE203: ELEMENTS OF MECHANICAL ENGG

**Unit-1:**

Introduction to measurement and measuring instruments, Generalized measuring system and functional elements, units of measurement, static performance characteristics and elementary idea of dynamic performance characteristics of measurement devices, calibration, concept of error (systematic and random), sources of error, statistical analysis of errors.

**Unit-2:**

**Engineering Materials:** Materials and Civilization, their socio economic impact. Engineering Materials their classification and applications, Material deterioration phenomenon.
**Metals & Alloys**: Properties and Applications, Mechanical Properties of Materials: Strength, elasticity, plasticity, stiffness, malleability, ductility, brittleness, malleability, toughness, hardness, resilience, hardness, machine ability, formability, weld ability. Elementary ideas of fracture fatigue & creep.
**Steels and Cast Irons:** Carbon steels, their classification based on percentage of carbon as low, mild, medium & high carbon steel, their properties & applications. Wrought iron. Cast iron. Alloy steels: stainless steel, tool steel.
**Alloys of Non Ferrous Metals:** Common uses of various non-ferrous metals (Copper, Zink, Tin, Magnesium, Lead, Aluminium etc.) & alloys and its composition such as Cu-alloys: Brass, Bronze, Al-alloys.

**Unit-3**
**Ceramics:** Structure types and properties and applications of ceramics. Mechanical/Electrical behaviour and processing of Ceramics.
**Plastics:** Various types of polymers/plastics and its applications. Mechanical behaviour and processing of plastics. Future of plastics.
**Heat Treatment**: Various types of heat treatment such as Annealing, Normalizing, Quenching, Tempering (Austempering, Martempering), and various case hardening processes. Time Temperature Transformation (TTT) diagrams.

**Unit-4**
**Basic Metal Forming & Casting Processes**. Forming Processes: Basic metal forming operations & uses of such as: Forging, Rolling, Wire & Tube drawing/making and Extrusion, and their uses.
**Press-work**: Die & Punch assembly, cutting and forming, its applications. Hot-working versus cold-working
**Casting:** Pattern: Materials, types and allowances. Type and composition of Moulding sands and their desirable properties. Mould making with the use of a core. Gating system. Casting defects & remedies. Cupola Furnace. Die-casting and its uses.

**Unit -5**
Mechanical properties and Testing: Stress strain diagram, Ductile & brittle material, Stress vs. strength.

Toughness, Hardness, Fracture, Fatigue and Creep. Testing of material such as Strength tests, Hardness tests, Impact tests, Fatigue tests, Creep tests, and Non-destructive testing (NDT).

**Basic concept of thermodynamic** -System, Control Volume, Surrounding, Boundaries, Universe, Types of Systems Thermodynamic Equilibrium, State, Property, Process, Exact & Inexact Differentials, Cycle Reversibility Quasi – static Process, Irreversible Process, Causes of Irreversibility, Zeroth law of thermodynamics: Concept of Temperature, First law of thermodynamics: Thermodynamic definition of work, Limitations of first law of thermodynamics.

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## UELEMAE206: ELEMENTS OF MECHANICAL ENGG LAB

**(a)** Experiments on heat treatment such as annealing, normalizing, quenching, case hardening and comparison of hardness before and after heat treatment.
**(b)** Study of corrosion and its effects.
**(c)** Strength test of a given mild steel specimen on UTM with full details and stress versus strain plot on the machine.
(d) To study the Pattern making with proper allowance.
(e) Study the working of simple measuring instruments- Vernier callipers, micrometer, and tachometer.
(f) Sand testing methods (at least one, such as grain fineness number determination)
(g) Study of NDT (non-destructive testing) methods like magnetic flaw detector, ultrasonic flaw detector, eddy current testing machine, dye penetrant tests.
(h) Creep test on creep testing machine.

**Books and References:**

1. Callisters Materials Science and Engineering, by William D. Callister, Jr, (Adopted by R. Balasubramaniam), Wiley India Pvt. Ltd.
2. Manufacturing Technology by P.N. Rao., TMH
3. Manufacturing Engineering & Technology by Kalpakjian, Pearson.
4. Metrology of Measurements by Bewoor and Kulkarni, TMH
5. Engineering Thermodynamics by P.K.Nag, TMH
6. Thermodynamics- An Engineering App

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## UFUNDAE204: FUNDAMENTAL OF COMPUTER PROGRAMMING

**UNIT I :**

Introduction to Computer System: Hardware, Software-system software, & application software; Introduction to Computing Environment; Introduction to Problem solving and notion of algorithm: Flow charting, Pseudo code, Corresponding sample C-programme, testing the code; Number Systems and their conversion: Decimal, Binary, Octal and Hexadecimal representations, bit, byte; Character representation: ASCII, sorting order; System software re-visited: machine language, symbolic language, higher level languages, what is a compiler, what is an operating system, Introduction to programme development

**UNIT II:**

Structure of a C-program, comments, identifiers; Fundamental Data Types**:** Character types, Integer, short, long, unsigned, single and double-precision floating point, complex, Boolean, constants; Basic Input/output: printf, formatting, scanf, eof errors; Operators and Expressions: Using numeric and relational operators, mixed operands and type conversion, Logical operators, Bit operations, Operator precedence and associatively,

**UNIT-III**

Arrays: Array notation and represtation. Functions in C:standard function, defining a function, inter-function communication- passing arguments by value, scope rules and global variables; Top-down program development.

**UNIT-IV**

Sequential search, Sorting arrays; Strings and string handling functions, Recursion; Structures: Purpose and usage of structures, declaring structures, assigning of structures. Array of structures.

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## UFUNDAE207 :FUNDAMENTALS OF COMPUTER PROGRAMMING LAB

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(1) Get familiar with OS and Environment.

(2) Get familiar with C compiler

(3) Implement and Test Small Routine in C

(4) Data type and variable: Evaluation of Expression

(5) Operators & Expression: Evaluation of Expression

(6) IF, SWITCH Statements: Iteration

(7) Repetition structure in C: Iteration, Function

(8) Modular Programming: Recursion, Function

(9) Arrays & Structures

(10) Pointers: Linked Lists

(11) Searching, Selection & Sorting

(12) Sorting & Strings

(13) Files & STD C Preprocessor

(14) STD C Libraries, Use of Std. C Library

**Suggested Reading**


Rajaraman V. 1985. Computer Oriented Numerical Methods. Prentice Hall of India. Pvt. Ltd., New Delhi.

Balagurusamy E. 1990. Programming in 'C'. Tata McGraw Hill Publishing Co. Ltd., 12/4 Asaf Ali Road, New Delhi.

Rajaraman V. 1995. Computer Programming in 'C'. Prentice Hall of India Pvt.Ltd., New Delhi. Bronson

G and Menconi S. 1995. A First Book of 'C' Fundamentals of 'C' Programming. Jaico Publishing House, New Delhi

Sahni S.. Data Structures, Algorithms and Applications in C++. University press (India) Pvt Ltd / Orient Longman Pvt. Ltd.

Michael T. Goodrich, R. Tamassia and D Mount. Data structures and Algorithms in C++. Wiley Student Edition, John Wiley and Sons.

Mark Allen Weiss. Data Structures and Algorithm Analysis in C++. Pearson Education. Augenstein,

Langsam and Tanenbaum. Data structures using C and C++. PHI/Pearson Education.

Drozdek Adam. Data Structures and Algorithms in C++. Vikas Publishing House / Thomson International Student Edition.

Agarwal, Ajay. The Complete Reference Guide: Data Structure through C. ISBN: 8178840448; Publisher: Cyber Tech Publications.

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## USURVAE205: SURVEYING & LEVELING

**Unit-1:**

Principle and basic concepts of surveying. Plans and maps. Classification of surveying. Basic measurements. Units of measurement. Types of Scales. Recording the measurement.

Principal of chain surveying. Types of Chains. Types of Ranging and Chaining. Chain and tape errors & corrections. Selection of survey station and lines. Offset measurement. Cross Staff Optical Square-Prism Square. Obstacles in chaining and ranging. Introduction to GPS survey.

**Unit-2**

Methods of traversing. Prismatic compass. Surveyors compass. Angle and bearing, Quadrantal system, Local attraction, Dip of angle. Magnetic declination, plotting a traverse survey, Errors In compass survey, Bow ditch's rule, Transit rule.

**Unit-3**

Plane tabling instruments and accessories, Methods and principal, Two points problem, Three points problem, Errors in plane tabling,Planimeter,Sextant,Band level,Abney level Clinometers, Pentameter, Computation of areas methods.

**Unit-4**

Definition, Basic principal of levelling, Benchmark, Types of levels optical, Principal causes telescopes sensitivity of bubble tubes, Levelling staff, Temporary adjustment, Permanent adjustment of levels, Field book entries, Reduction of levels missing entries , Types of levelling, Simple and differential levelling, Check levelling & reciprocal levelling, Precise levelling, profile levelling,

**Unit-5**

Theodolite traversing, Theodolite Surveying, Ranging by theodolite.Temporary & Permanent adjustment of theodolite.

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## USURVAE208:SURVEYING AND LEVELLING LAB.

(1) Chain survey of an area and preparation of map.
(2) Compass survey of an area and plotting of compass survey.
(3) Plane table surveying.
(4) Levelling. L section and X sections and its plotting.
(5) Contour survey of an area and preparation of contour map.
(6) Introduction of software in drawing contour.
(7) Theodolite surveying.
(8) Ranging by Theodolite, Height of object by using Theodolite; Setting out curves by Theodolite.
(9) Minor instruments. Use of total station.

**Text books:**

1- Surveying and Levelling Part-1 by T.P. Kanetkar & S.V.Kulkarni , Pune Vidyarthi Griha Prakashan

**Reference Material:**

1- Surveying and Levelling By B C Punamia Vol-I & Vol-II,Laxmi Publications,2005 2- Surveying-III Higher Surveying, B.C Punamia, Laxmi Publications 2004