

The logo for Bikaner Technical University, consisting of several overlapping circles in blue, black, and yellow.

**Bikaner Technical University,
Rajasthan B.E./B.Tech CSE Sem 2
syllabus**

Engineering Mathematics - II

2FY2-01: Engineering Mathematics-II

Credit: 4

Matrices:

Rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.

First order ordinary differential equations:

Linear and Bernoulli's equations, Exact equations, Equations not of first degree: equations solvable for p , equations solvable for y , equations solvable for x and Clairaut's type.

Ordinary differential equations of higher orders:

Linear Differential Equations of Higher order with constant coefficients, Simultaneous Linear Differential Equations, Second order linear differential equations with variable coefficients: Homogenous and Exact forms, one part of CF is known, Change of dependent and independent variables, method of variation of parameters, Cauchy- Euler equation; Power series solutions including Legendre differential equation and Bessel differential equations.

Partial Differential Equations - First order:

Order and Degree, Formation; Linear Partial differential equations of First order, Lagrange's Form, Non Linear Partial Differential equations of first order, Charpit's method, Standard forms.

Partial Differential Equations- Higher order:

Classification of Second order partial differential equations, Separation of variables method to simple problems in Cartesian coordinates including two dimensional Laplace, one dimensional Heat and one dimensional Wave equations.

Human Values

Unit - 1

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

Understanding the need, basic guidelines, Self Exploration - its content and process; 'Natural Acceptance' and Experiential Validation,

Continuous Happiness and Prosperity- Human Aspirations, Right understanding, Relationship and Physical Facilities, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario.

Method to fulfill the above human aspirations: understanding and living in harmony at various levels

Unit - 2

Understanding Harmony in the Human Being - Harmony in Myself
Understanding human being as a co-existence of the sentient 'I' and the material 'Body'

Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha
Understanding the Body as an instrument of 'I', Understanding the characteristics and activities of 'I' and harmony in 'I' Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs

to ensure Sanyam and Swasthya.

Unit - 3

Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

Understanding harmony in the Family, Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) , meaning of Vishwas; Difference between intention and

competence, meaning of Samman, Difference between respect and differentiation;
the other salient values in relationship, harmony in the society ,
Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human
Goals ,Visualizing a universal harmonious order in society- Undivided
Society (AkhandSamaj), Universal Order (SarvabhaumVyawastha)-
from family to world family.

Unit - 4

Understanding Harmony in the Nature and Existence - Whole
existence as Coexistence

Understanding the harmony in the Nature. Interconnectedness and
mutual fulfillment among the four orders of nature- recyclability and
self-regulation in nature. Understanding Existence as Co-existence
(Sah-astitva) of mutually interacting units in allpervasive Space.
Holistic perception of harmony at all levels of existence

Unit - 5

Implications of the above Holistic Understanding of Harmony on
Professional Ethics. Natural acceptance of human values
Definitiveness of Ethical Human Conduct. Basis for Humanistic
Education, Humanistic Constitution and Humanistic Universal Order.
Competence in Professional Ethics: a) Ability to utilize the
professional
competence for augmenting universal human order,
b) Ability to identify the scope and characteristics of people-friendly
and eco-friendly production systems, technologies and management
models. Strategy for transition from the present state to Universal
Human Order: At the level of individual: as socially and ecologically
responsible engineers, technologists and managers. Case studies
related to values in professional life and individual life.

Basic Electrical Engineering

Unit 1

DC Circuits:

Electrical circuit elements (R, L and C), voltage and current sources,
Kirchhoff current and voltage laws, Series-Parallel circuits, Node
voltage method, Mesh current method, Superposition, Thevenin's,
Norton's and Maximum power transfer theorems.

Unit 2

AC Circuits:

Representation of sinusoidal waveforms, peak and r.m.s values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase AC circuits consisting of R, L, C, RL, RC and RLC combinations (series and parallel), resonance. Three phase balanced circuits, voltage and current relations in star and delta connections.

Unit 3

Transformers:

Ideal and practical transformer, EMF equation, equivalent circuit, losses in transformers, regulation and efficiency. 4

Unit 4

Electrical Machines:

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Starting and speed control of induction motor, single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited DC motor. Construction and working of synchronous generators.

Unit 5

Power Converters:

Semiconductor PN junction diode and transistor (BJT). Characteristics of SCR, power transistor and IGBT. Basic circuits of single phase rectifier with R load, Single phase Inverter, DC-DC converter.

Unit 6

Electrical Installations:

Layout of LT switchgear: Switch fuse unit (SFU), MCB, ELCB, MCCB, Type of earthing. Power measurement, elementary calculations for energy consumption.

Programming for Problem Solving

Unit 1 Fundamentals of Computer:

Stored program architecture of computers, Storage device- Primary memory, and Secondary storage, Random, Direct, Sequential access methods, Concepts of High-level, Assembly and Low-level languages, Representing algorithms through flowchart and pseudo code.

Unit 2 Number system:

Data representations, Concepts of radix and representation of

numbers in radix r with special cases of $r=2, 8, 10$ and 16 with conversion from radix r_1 to r_2 , r 's and $(r-1)$'s complement, Binary addition, Binary subtraction, Representation of alphabets.

Unit 3 C Programming:

Problem specification, flow chart, data types, assignment statements, input output statements, developing simple C programs, If statement, for loops, while loops, do-while loops, switch statement, break statement, continue statement, development of C programs using above statements, Arrays, functions, parameter passing, recursion, Programming in C using these statements, Structures, files, pointers and multi file handling.

Communication Skills

Unit 1

Communication:

Meaning, Importance and Cycle of Communication. Media and Types of Communication. Verbal and Non-Verbal Communication. Barriers to communication. Formal and Informal Channels of Communication (Corporate Communication). Divisions of Human Communication and Methods to improve Interpersonal Communication. Qualities of good communication.

Unit 2

Grammar:

Passive Voice. Reported Speech. Conditional Sentences. Modal Verbs. Linking Words (Conjunctions) 5

Unit 3

Composition:

Job Application and Curriculum-Vitae Writing. Business Letter Writing. Paragraph Writing. Report Writing. 5

Unit 4

Short Stories:

“Luncheon” by Somerset Maugham. “How Much Land Does a Man Need?” by Count Leo Tolstoy. “The Night Train at Deoli” by Ruskin Bond.

Unit 5

Poems:

“No Men are Foreign” by James Kirkup. “If” by Rudyard Kipling.

“Where the Mind is without Fear” by Rabindranath Tagore.

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