

The logo for Biju Patnaik University of Technology, consisting of several overlapping circles in blue, black, and yellow.

**Biju Patnaik University of
Technology, Odisha B.E./B.Tech
CSE Sem 1 syllabus**

Mathematics-I

RMA1A001 Mathematics-I

Module-1

Asymptote, Curvature (Cartesian and polar), Gamma & Beta function, Partial differentiation, Maxima and Minima for function of two variables.

Module-2

Differential Equation: First order differential equations, Separable Equation, Exact differential equation, Linear differential equation, Bernoulli's equation application to Electrical circuits.

Module-3

Linear differential equation of second, Homogeneous equation with constant co-efficient, Euler-Cauchy equations, Solution by undetermined co-efficient, Solutions by variation of parameters, Modelling of electric circuits

Module-4

Series solution of differential equations, Power series method, Legendreequation and Legendre polynomial. Bessels function and its properties.

Module - 5

Laplace transformation and its use in getting solution to differential equations, Convolution, Integral Equations.

Text Books:

1. Differential Calculus by Santi Narayan and Mittal,
2. Advanced Engineering Mathematics by E. Kreyszig, Tenth Edition, Willey
3. Higher Engineering Mathematics by B.V. Raman, , Mc-Graw

References:

1. Ordinary and Partial Differential equations by J. Sihna Ray and S Padhy, Kalyani Publishers
2. Advance Engineering Mathematics by P.V.O'NEIL, CENGAGE
3. Ordinary Differential Equation by P C Biswal , PHI second edition.
4. Engineering Mathematics by P. S. Das & C. Vijayakumari, Pearson.

Physics

PHYSICS

Module I

Oscillation & Waves

Simple Harmonic Oscillation: velocity of motion, acceleration, time period, frequency, phase; damped harmonic oscillation: Wave equation of damped vibration, logarithmic decrement, quality factor, relaxation time; Forced oscillation, resonance, velocity resonance and amplitude resonance, coupled oscillation, Normal coordinates and normal frequencies, In-phase and out-of-Phase Oscillation, Concept of wave and wave equation,, reflection and transmission of longitudinal waves at boundaries.

Module II

OPTICS

Concept of interference, two sources interference pattern, Bi-prism, Fringe width, uses of biprism, Newton's ring & measurement of wavelength and refractive index. Diffraction: Huygen's principle, Fresnel's Diffraction and Fraunhofer's diffraction, Half period zone, Zone plate, construction, principle, multiple foci, comparison of zone plate with convex lens, Fraunhofer's diffraction of Single slit, intensity distribution

Module III

LASER and Fibre Optics :

Atomic excitation and energy states, Interaction of external energy with atomic energy states, Absorption, spontaneous emission and stimulated emission, Population inversion, Pumping mechanism, optical pumping, Electrical Pumping, Components of laser system, active medium, population inversion, Ruby laser, Helium-Neon laser,

Semiconductor laser (basic concepts, and Engineering application only), Structure of optical fibre, Principle of propagation and numerical aperture, Acceptance angle, classification of optical fibre (Single mode and Multimode, SIN and GRIN), FOCL (Fiber Optic Communication Link)

Solid State Physics

Crystalline and Amorphous solid, unit cell, lattice parameter, Miller Indices, Reciprocal Lattice(Only Concept), Bragg's law, Concept of fermions and Bosons and their distribution Functions, Band theory of Solids(Qualitative), Classification of materials: metals, semiconductor and insulator in terms of band theory.

Module IV

Electromagnetism

(Student will be familiarized with some basic used in vector calculus prior to Development of Maxwell's electromagnetic wave equations. No proof of theorems and laws included in this unit expected-statement and interpretation should sufficient.)

Introduction; Scalar & vector fields, Gradient Of Scalar Field, divergence and curl of Vector Field, Gauss divergence theorem, Stokes theorem (Only Statements, no proof), Gauss's law of electrostatics in free space and in a medium (Only statements), Faraday's law of electromagnetic induction (Only statements) Displacement current, Ampere's circuital law, Maxwell's equation in Differential and Integral form, Electromagnetic wave equation in E and, Electromagnetic Energy, Poynting theorem and Poynting vector(no derivation)

Module V

Quantum Physics:

Elementary concepts of quantum physics formulation to deal with physical systems. Need for Quantum physics- historical overviews (For concept), Einstein equation, de Broglie Hypothesis of matter waves, Compton Scattering, Pair production (no derivation), Uncertainty Principle, Application of Uncertainty Principle, Non-existence of electrons in the Nucleus, Ground state energy of a harmonic oscillator. Basic Features of Quantum Mechanics: Transition from deterministic to Probabilistic, Wave function, probability density, Normalization of wave function (Simple problem), observables and operators, expectation values (Simple problem), Schrodinger equation-Time dependent and time independent equation Application: Free Particle and Particle in a box

Books:

1. Engineering Physics by D.R. Joshi, Mc Graw Hill
2. Principle of Physics Vol. I & Vol. II by Md. M. Khan & S.Panigrahi(Cambridge Univ. Press).
3. Lectures on Engineering Physics by L. Maharana, Prafulla ku. Panda, Sarat Ku.Dash, Babita Ojha (Pearson)
4. Engineering Physics by D.K. Bhattacharrya and Poom Tondon , Oxford University Press

Reference Books:

1. Optics - A. K.Ghatak
2. Introduction to Electrodynamics - David J. Griffiths, PHI Publication
3. Concepts of Modern Physics - Arthur Beiser.
4. Physics-I for engineering degree students - B.B. Swain and P.K.Jena.

Chemistry

CHEMISTRY

Module I:

Quantum Chemistry and Spectroscopy: Basic concepts and postulates of quantum mechanics. Introduction to Schrodinger Wave Equation (without derivation), Particle in a box: Energy levels, quantum numbers and selection rule.

Spectroscopy: Lambert Beer's Law, Principles and applications of UV-Visible Molecular Absorption Spectroscopy; Chromophores, applications on quantitative analysis. Effect of conjugation on chromophores, Absorption by aromatic systems, introductory idea on rotational and vibrational Spectroscopy Principles and application to diatomic molecules.

Module II:

The phase rule: Statement of Gibb's phase rule and explanation of the terms involved, Phase diagram of one component system - water and sulfur system, Condensed phase rule, Phase diagram of two component system - Eutectic Bi-Cd, Pb-Tin system & Isomorphous System.

Module III:

Fuels: Classification of fuels, calorific value. (Determination by Dulong's formula), G.C.V. and N.C.V., Solid fuels, Analysis of coal. Liquid fuels: Classification of petroleum, Refining of petroleum, Cracking, Knocking and anti knocking, cetane and octane numbers. Unleaded petrol, synthetic petrol, power alcohol. Gaseous Fuel: Producer gas, Water gas, LPG, CNG, Kerosene gas, Combustion

calculation.

Module IV:

Corrosion: Electrochemical theory of corrosion, galvanic series, Types of corrosion; Differential metal corrosion, Differential aeration corrosion (Pitting and water line corrosion), Stress corrosion (caustic embrittlement in boilers), Factors affecting, metal coatings - Galvanizing and Timing, Corrosion inhibitors, cathodic protection.

Module-V:

New Materials: Introduction to nanomaterials, classification (0D, 1D, 2D) with examples, size dependent properties, Top-down and Bottom-up approaches of nanomaterial synthesis. Introductory idea on synthesis of nanomaterials via green synthetic route. Application of nanomaterials in environmental fields and electronic devices.

Text Books:

1. Engineering Chemistry (NPTEL web-book) by B. L. Tembe, Kamaludddin and M. S. Krishan.
2. Text Book in Applied Chemistry by A. N. Acharya and B. Samantaray, Pearson India.
3. Fundamentals of Molecular Spectroscopy by Banwell, Tata McGraw Hill Education.
4. Textbook of nanoscience and Nanotechnology, McGraw Hill Education (India) Pvt. Ltd., 2012.
5. Advanced Engineering Chemistry by M. R. Senapati, University Science Press, India..
6. Engineering Chemistry, Jain and Jain, Dhanpat Rai Publication.

Reference Books:

1. Inorganic Chemistry by Donald A. Tarr, Gary Miessler, Pearson India, Third Edition.
2. Quantum Chemistry by Ira N. Levine, Pearson 7th Edition.
3. Molecular Spectroscopy, Ira N. Levine, John Wiley and Sons
4. Modern Spectroscopy - A Molecular Approach, by Donald McQuarrie and John Simon, published by University Science Books.
7. Inorganic Chemistry by W. Overton, Rounk and Armstrong, Oxford University Press, 6th edition.
8. Introductory to Quantum Chemistry by A. K. Chandra. , 4th Edition, McGrawHill Education.

Basic Electrical Engineering

Basic Electrical Engineering

Module 1:

DC & AC Circuits

Circuit laws: Fundamentals of electrical circuit, Ohm's law, Kirchoff's laws, series and parallel connections, analysis of circuits using Node voltage, mesh current, superposition, Thevenin and Norton Theorems to solve simple circuits with dc excitation. Single phase circuit: Single phase emf generation, Representation of sinusoidal waveforms, average, effective, peak and rms values, j operator, Rectangular and polar representation of phasors, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel).

Module 2:

Three Phase Circuits

Three phase circuit: Three phase emf generation, Delta-star and star-delta conversions, voltage and current relations in star and delta connections. solution of the three phase circuits with balanced voltage and balanced load conditions, phasor diagram, measurement of power in three phase circuits.

Module 3:

Magnetic Circuits

Magnetic Circuits: MMF, flux, reluctance, inductance. Review of Ampere Law, Biot Savart Law. Magnetic field, BH characteristics and Hysteresis loss, Series and parallel magnetic circuits.

Module 4:

Electrical Machines

Transformers (Single Phase): Construction, operation, Phasor diagram and performance testing. Induction Motors (Three Phase): Basic Principles, Rotating Magnetic Field, Equivalent circuit, Phasor diagram, Torque-Speed Characteristics Basics of DC machines: EMF Equation, Torque Equation, Methods of Excitation

Text / References:

1. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010
2. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
3. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.
4. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.

Basic Electronics Engineering

Basic Electronics Engineering

Module 01 :

Introduction to Semiconductors, Junction Diode: Principle of Diodes, V-I characteristics of junction diode, AC and DC Resistance of Diode, Diode Current Equation, Equivalent circuit of Diode, Breakdown Mechanism, Zener Diode, Rectifier circuit, Clipper and Clamper, Avalanche Diode Bipolar Junction Transistor: Transistor Operation, Current Equation in n-p-n & amplifier; p-n-p transistors, CB, CE, CC Configurations and their Characteristics, Load line Analysis, DC Biasing (Fixed bias and Voltage Divider), Introduction to Amplifiers.

Module 02 :

Field Effect Transistor: JFET-types, Operations and their Characteristics, MOSFETs- types, Operations and their Characteristics CMOS: Brief Introduction to CMOS, Principle of operation of Digital Inverters, VTC Characteristics,

Module 03:

Operational Amplifiers: The Ideal Op Amp, Inverting and Non - Inverting configurations, Equivalent Circuit model, Op amp application in Integration, Differentiation and Summing Circuits.

Module 04 :

Digital Electronic Principles: Introduction, Binary digits, Logic levels and Digital waveforms, Introduction to basic Logic operation, Number system, Decimal numbers, Binary numbers, Decimal-to-Binary conversion, Simple binary arithmetic, Logic Gates, Boolean algebra and Combinational Logic Circuits: The inverter, The AND, OR, NAND NOR, Exclusive-OR and Exclusive-NOR gate, Boolean operations and expressions, Laws and Rules of Boolean algebra, De Morgan's theorem, Boolean analysis of logic circuits, Standard forms of Boolean expressions, Boolean expression and truth table. Basic combinational logic circuits, Implementation of combinational logic, the universal properties of NAND and NOR gates, Basic adders.

Text book:

1. Electronic Devices Circuit Theory - by Rober L. Boylestad 11th Edition, Pearson Publication, 2014
2. Microelectronic Circuits by A. S. Sedra and Kenneth C. Smith 7th Edition, Oxford University Press. 2017
3. Digital Design by M. Morris Mano, 5th Edition, Pearson Publication, 2016.

Basic Mechanical Engineering

Basic Mechanical Engineering

MODULE-I

Thermodynamics:

Systems, Properties, Process, State, Cycle, Internal energy, Enthalpy, Zeroth Law, First law and Second Law of Thermodynamics, Basic Concept of Entropy, Properties of ideal gas., Properties of pure substances, Steam formation, Types of Steam, Enthalpy, Specific volume, Internal energy and dryness fraction of steam, use of Steam tables. Related numericals.

MODULE-II

Application of Thermodynamics:

Air compressors, Steam Power Plant, Refrigerators and Heat pump, I.C. Engines (Brief Description of different components of above mentioned systems and working principles with schematic diagram only)

MODULE-III

Basic Power transmission devices:

Belt, Rope, Gear drives, Coupling, clutch, brakes. (Working principle only)

Introduction to Robotics:

Robot anatomy, joints and links and common robot configurations

MODULE-IV

Mechanical Measurements:

Temperature, pressure, velocity, flow, strain, force, torque measurements. (Working principle only).

Text books

- i. Basic Mechanical Engineering by Pravin Kumar, Pearson
- ii. Basic Mechanical Engineering by A R Israni, P K Shah, BSPublications
- iii. Text book of Elements of Mechanical Engineering, S T Murthy, Universitiespress
- iv. Basic and applied Thermodynamics by P. K. Nag, Tata McGraw Hill

Reference books

- i. Basic Mechanical Engineering by .D. Mishra, P.K Parida, S.S.Sahoo, India Tech Publishing company
- ii. Elements of Mechanical Engineering by J K Kittur and G D

Gokak, Willey

iii. Basic Mechanical Engineering by Basant Agrawal, C M Agrawal, Willey

iv. Engineering Thermodynamics by P. Chattopadhyaya, Oxford University Press

Basic Civil Engineering

Basic Civil Engineering

MODULE-I

Introduction and Scope of Civil Engineering. Broad disciplines of Civil Engineering; Importance of Civil Engineering, Early constructions and developments over time, Development of various materials of construction and methods of construction.

Building Material and Building Construction:

Bricks: Brick as a construction material and its importance, qualities of a good brick, Stone: classification, composition and characteristics, Cement: Classification, tests for cement, uses of cement, types of cement, Concrete: Quality of mixing water, Workability, Compaction of concrete, concrete mix design, Grade and strength of Concrete. Fundamentals of R.C.C. and Prestressed concrete. Types of steels used in civil engineering works.

Building Components and their basic requirements, Mortar, Stone masonry, brick masonry, roof, floors.

MODULE-II

Surveying: Linear measurement and chain survey: Use of chains and tapes for measurement of correct length of lines, direct and indirect ranging, Compass surveying: Use of prismatic compass, bearing of a line. Local attraction, Introduction to modern surveying instruments EDM and Total Station.

MODULE-III

Fundamental of soil and its classification, Foundations: Types of shallow and deep foundations with neat sketches. Fundamentals of Irrigation Engineering. Introduction of Hydraulics structure like canals, siphons, weirs, dams etc.

MODULE-IV

Transport, Traffic and Urban Engineering: Introduction to planning and design aspects of transportation engineering, different modes of transport, highway engineering, rail engineering, airport engineering, traffic engineering, urban engineering

TEXT BOOKS

- i. Basic Civil Engineering, S. Gopi, Pearson
- ii. Building Construction, Sushil Kumar, Standard Publishers Distributors
- iii. Surveying and Levelling by R. Subramanian, Oxford University Press

REFERENCE BOOKS

- i. Engineering Materials, S.C. Rangwala, Charotar Publishing House
- ii. Building Material and Construction, G C Sahu, Joygopal Jena, McGraw Hill
- iii. Surveying Vol-1 by R Agor, Khanna Publishers
- iv. Basic Civil Engineering, M.S. Palanichamy, McGraw Hill

Communicative English

RCE1E001 Communicative English

Module 1

Introduction to communication

The importance of communication through English at the present time; the process of communication and factors that influence communication : sender, receiver, channel, code, topic, message, context, feedback, 'noise', filters and barriers; the importance of audience and purpose

Verbal and non-verbal communication

Listening Skills: Importance and types of Listening

Identifying and rectifying common errors: Subject-verb agreement, Noun/ Pronoun/ Articles/ Prepositions Usage, Word choice

Vocabulary Building

Module 2

The sounds of English

The International Phonetic Alphabet (IPA); Vowels, diphthongs, consonants, consonant clusters; phonemic transcription; Syllable division and word stress; sentence rhythm and weak forms, contrastive stress

Intonation: falling, rising and falling-rising tunes

Problem sounds in cultural contexts (Indian context)

Module 3

Workplace Communication

Communication challenges in culturally diverse workforce; Ethics in

Communication Bias-free communication

3.2 Effective Business Presentations: Importance in workplace communication; Planning, Preparing, Organizing, Rehearsing, and Delivering Oral presentations, Handling Questions; Power Point Presentation

Module 4

Writing at Work

Business letters

Writing notices, circulars, emails.

Writing reports and Proposals

Writing CVs (for Technical Positions and Internships)

Module 5

5. Soft Skills/Life Skills

Body Language

Connected Speech (Intonation in Everyday Speaking and Conversation)

Types of interviews, Planning and Preparing for a Job Interview; Stages of an Interview; Mastering the art of giving interviews.

Team Management and Leadership Skills; Group Discussion; Public Speaking (Reference: Martin Luther King: I have a Dream, Vivekananda: Chicago Address, Toni Morrison: Noble Prize Acceptance Speech)

Recommended Books:

1. Business Communication by Carol M Lehman, Debbie D Dufrene and MalaSinha. Cengage Learning. 2nd Edition.
2. English Grammar in Use. Raymond Murphy. Cambridge UP. 4th Edition.
3. A Textbook of English Phonetics for Indian Students by T. Balasubramanian [MACMILLAN]
4. Soft Skills: Key to Success in Workplace and Life by Meenakshi Raman and Shalini Upadhyay. Cengage Learning. 2018 Edition.

Reference Books:

1. Technical Communication, Principle and Practice by Meenakshi Raman & Sangeeta Sharma, Oxford University Press
2. Business Communication Today by Courtland L Bovee and Thill, Pearson.
3. Communication skill by Sanjay Kumar & Puspa Lata, Oxford University Press. 2 nd Edition.

4. Body Language. Allan Pease. Free on Googlebooks.
5. Business and Managerial Communication, Sengupta, PHI
6. Business Communication for Managers, P. Mehra, Pearson

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