SYLLABUS

Semester 2

BBD UNIVERSITY

Babu Banarasi Das University

B Tech. CSE-AI

Compiled by **Krishna Singh**

PROGRAMMING CONCEPTS WITH PYTHON

Semester 2 Syllabus

MODULE 1

Introduction and Conditional Statements: *Programming Cycle for Python, Python IDE, Interacting with Python Programs, Elements of Python, Type Conversion.*

Basics: *Expressions, Assignment Statement, Arithmetic Operators, Operator Precedence, Boolean Expression.*

Conditionals: *Conditional statement in Python (if-else statement, its working and execution), Nested-if statement and El-if statement in Python, Expression Evaluation & Float Representation.*

MODULE 2

Loop, Function and Strings:

Loops: *Purpose and working of loops, While loop including its working, For Loop, Nested Loops, Break and Continue.*

Function: *Parts of A Function, Execution of A Function, Keyword and Default Arguments, Scope Rules.*

Strings: *Length of the string and perform Concatenation and Repeat operations in it, Indexing and Slicing of Strings.*

Python Data Structure: *Tuples, Unpacking Sequences, Lists, Mutable Sequences, List Comprehension, Sets, Dictionaries*

MODULE 3

Sieve Of Eratosthenes & File I/0:

Sieve of Eratosthenes: *Generate prime numbers with the help of an algorithm given by the Greek Mathematician named Eratosthenes, whose algorithm is known as Sieve of Eratosthenes.*

File I/O: *File input and output operations in Python Programming.*

Exceptions and Assertions Modules: *Introduction, Importing Modules.*

Abstract Data Types: *Abstract data types and ADT interface in Python Programming.*

Classes: *Class definition and other operations in the classes, Special Methods (such as init, str, comparison methods and Arithmetic methods etc.), Class Example, Inheritance, Inheritance and OOP.*

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ENGINEERING MECHANICS

Semester 2 Syllabus

MODULE 1

Two-Dimensional Concurrent Force Systems: *Basic concepts, Laws of motion, Principle of Transmissibility of forces, Transfer of a force to parallel position, Resultant of a force system, Simplest Resultant of two-dimensional concurrent Force systems.*

Two-dimensional Non-concurrent Force systems: *Resultant of Two-dimensional Non-concurrent Force systems, Distributed force system, free body diagrams, Equilibrium and Equations of Equilibrium, Applications.*

MODULE 2

Beam: *Introduction, Types of support, Types of load on beam, Types of beam, Reactions from supports of beam.*

Friction: *Introduction, Laws of Coulomb Friction, Equilibrium of Bodies involving Dry friction, Belt friction, Application.*

MODULE 3

Trusses: *Introduction, Perfect, Deficient, and Redundant truss, Solution of Simple truss by Method of Joints.*

Centroid and Moment of Inertia: *Introduction, Centroid of plane figure and composite figure, Moment of inertia of plane area, Parallel Axes Theorem & Perpendicular axes theorem, Moment of inertia of composite bodies.*

MODULE 4

Kinematics and Kinetics: *Linear motion, D'Alembert principle, Impulse and momentum principle, Work and energy principle.*

Simple Stress and Strain: *Normal and Shear stresses, Stress- Strain Diagrams for ductile and brittle material, Elastic Constants, One Dimensional Loading of members of varying cross-sections.*

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ENGINEERING PHYSICS

Semester 2 Syllabus

MODULE 1

WAVE OPTICS

Interference: *Coherent sources, Division of wave front and division of amplitude, Interference in thin film, Wedge shaped film, Newton's ring its applications.*

Diffraction: *Single slit and N-slit, Diffraction grating, Grating spectra, Dispersive power of grating, Rayleigh criterion and resolving power of grating.*

Polarisation: *Double refraction, Nicol prism, Production and detection of plane, circularly and elliptically polarised light, Optical activity, Specific rotation and Polarimeter (Half shade and Biquartz).*

MODULE 2

QUANTUM MECHANICS

Wave particle duality, de-Broglie matter wave, Davisson- Germer experiment, Phase velocity and group velocity, Uncertainty principle and its applications (Non-existence of electron, existence electron), Wave function and its significance, Schrodinger equation and its significance, Particle dimensional box.

Diffraction of X-rays: *Laue's experiment, Bragg's Law, Bragg's spectrometer.*

MODULE 3

ELECTROMAGNETIC THEORY

Displacement current, Equation of continuity, Maxwell's equations (Integral and Differential forms), EM-wave equation and its propagation in free space, Transverse nature of Electromagnetic waves, Poynting vector and Poynting Theorem.

Fibre Optics: *Fundamental ideas about optical fibre, Types of optical fibre, Acceptance angle and acceptance cone, Numerical aperture and V-number, Applications of Optical fibre.*

MODULE 4

RELATIVISTIC MECHANICS

Inertial and non-inertial frames, Concept of ether, Michelson and Morley Experiment, Einstein's basic postulate of special theory of relativity, Lorentz transformation equations, Length contraction, Time dilation, Variation of mass with velocity, relativistic velocity addition theorem, Mass-energy Equivalence.

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BASIC ELECTRONICS ENGINEERING

Semester 2 Syllabus

MODULE 1

DIODES

Energy band theory, Semiconductor material, Mass action law, PN junction: Forward and Reverse Bias characteristics, Diode as Rectifier: Half wave and Full wave Rectifiers, Clippers: Series Clippers, Breakdown Mechanism: Zener & Avalanche breakdown, Zener Diode and its application, Light Emitting Diode (LED).

MODULE 2

TRANSISTORS

Construction of Bipolar Junction Transistor: PNP and NPN, Working of Transistor, Base-Width modulation (Early Effect), Thermal Runaway BJT configurations: CE, CB and CC, Input & Output characteristics of CB & CE configuration, Biasing: Fixed bias, Emitter bias, Potential divider bias, Collector feedback Configuration, Comparison of biasing circuits. Transistor Amplifying Action.

JFET: *Basic construction and characteristics, Concept of pinch off, maximum drain saturation current, Input and transfer characteristics, Biasing: Self bias, fixed bias and Voltage divider bias.*

MODULE 3

OPERATIONAL AMPLIFIER AND DIGITAL ELECTRONICS:

Introduction to OP-AMP, Equivalent Circuit and Pin diagram of Op-amp IC741, Characteristics of ideal OP-AMP, Input Offset Current, Input Bias Current, Basics of ideal and practical OP-AMP, Configurations: Open loop and closed loop, Applications of OP-AMP, Inverting amplifier, Non-inverting amplifier, Voltage follower, summing amplifier, Difference Amplifier, Integrator and Differentiator. Principle of feedback, Concept of positive and Negative feedback.

Number System, Complements, Subtraction of binary number using 1's and 2's Complements, Excess 3 code, Gray 30 Hours CO3, CO4 Code (Cyclic Code), Boolean Algebra: Basic Theorems and De Morgan Theorems, Standard logic gates, Universal Logic Gates, Implementation of Boolean function using Basic gates and Universal gates.

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ENVIRONMENT AND ECOLOGICAL SUSTAINABILITY

Semester 2 Syllabus

MODULE 1

ENVIRONMENT AND ECOLOGY

Environment and its segments: *Definition, Scope and importance; Atmosphere: Composition, characterization, temperature behaviour and atmospheric stability, climate change, Hydrosphere, Water distribution.*

Lithosphere: *Structure and composition. Biosphere.*

Ecology and Ecosystem: *Introduction, Concept of an Ecosystem, Structure and function of Ecosystem, Energy flow in an Ecosystem, Food chain and food web, Types of Ecosystems.*

Ecological Pyramids: *Definition, Types of Ecological pyramid.*

Material cycle: *Definition and importance, Nitrogen and carbon cycle.*
Environmental Impact Assessment (EIA): *Definition and Concept, Elements of EIA, Methods and its benefit.*

MODULE 2

NATURAL RESOURCES AND ITS SUSTAINABLE USES

Natural resources: *Definition, types of natural resource Water Resources: Drinking water Quality, Water crisis and uses, Water borne and water induced diseases, Fluoride problem in drinking water, Rain water harvesting.*

Forest Resources: *Impact of deforestation on environment***.**

Food resources: *Crisis, Food adulteration and Hygiene National Policy for Food Security and Managements.*

Mineral Resources: *Use and exploitation of minerals, Impact of miming on environment.*

Energy resources: *Conventional and non-conventional energy sources, Solar energy, Hydropower energy, Hydrogen energy, biomass-energy.*

Sustainable Development: *Definition, sustainable use and conversation of natural resource, Equitable use of Resources, Common Property Resources, Biodiversity and its conservation.*

Environmental Management System (EMS): *Definition, stages of EMS, Cost and Benefits of EMS.*

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MODULE 3

ENVIRONMENTAL POLLUTION AND PROTECTION

Environmental Pollution: *Definition, Pollutants, sources, causes, effects and control measures of air, water, and soil pollution.*

Noise: *Sources of Noise pollution, Measurement of noise, Noise exposure levels and standards. Impact of noise on human health. Noise control and abatement measures.*

Current environmental Issues: *Population growth, Logistic growth curve equation. Climate change, Global Warming, Acid rain, Ozone layer, Waste Water Treatments.*

Solid Waste Management, Natural disaster and its management.

Environment Protection: *Legal aspects of Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Role of NGOs in Environment Protection.*

- *Environmental Protection and Sustainability.*
- *Environmental Education and Awareness.*

DIFFERENTIAL EQUATIONS AND FOURIER ANALYSIS

Semester 2 Syllabus

MODULE 1

DIFFERENTIAL EQUATIONS

Linear differential equations of nth order with constant coefficients. Complementary functions and particular integrals. Simultaneous linear differential equations. Solution of second order differentia equation by changing dependent and independent variables. Method of variation of parameters. Applications to engineering problems (without derivation).

MODULE 2

SERIES SOLUTION AND SPECIAL FUNCTIONS

Series solution of ordinary differential equations of 2nd order with variable coefficients (Frobenius Method), Bessel and Legendre equations and their series solutions. Properties of Bessel functions and Legendre polynomials.

MODULE 3

FOURIER SERIES

Periodic functions, Trigonometric series, Fourier series of period 2π, Euler's formulae, Functions having arbitrary period, Change of interval, Even and odd functions, Half range sine and cosine series. Harmonic Analysis.

MODULE 4

PARTIAL DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS

Homogeneous Linear partial differential with constant coefficients, Non-Homogeneous Linear partial differential equation with constant coefficients. Method of separation of variables for solving partial differential equations, Wave equation up to two-dimensions. Laplace equation in two dimensions, Heat conduction equations up to two-dimensions. Equations of transmission lines.

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