

"Education for Knowledge, Science and Culture"

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VIVEKANAND COLLEGE, KOLHAPUR (AUTONOMOUS)



Bridge Course Syllabus

Sr. No.	Subject	Total Clock Hours
1	Physics	15
2	Chemistry	15
3	Mathematics	15
4	Electronics	15
5	Statistics	15
6	Botany	15
7	Zoology	15
8	Micro biotech	15
9	Computer Science	15

Subject :- Physics [15 Hours]

Unit I Mechanics

[7]

Scalar quantity and vector quantities, Units and dimensions, Surface tension: definition and unit, Moment of inertia, Elasticity: Elastic constants, Newton's laws of motion, Viscosity: streamline flow, turbulent flow, rate of flow, Center of mass, Center of gravity, Oscillations: Types of ac, Reflection of light, Refraction of light, Interference, diffraction and polarization of light, Ohm's law, Kirchhoff's law, Coulomb's law, Faraday's law, Lenz's law, Self inductance, Mutual inductance, Resonance of electric circuit, Stationary waves, Kinetic energy, Potential energy, work done, conservation laws, Kepler's laws, Newton's law of gravitation,

Unit II Heat and thermodynamics

[8]

Thermodynamic system, Thermodynamic state, Thermodynamic variables, Thermodynamic equilibrium, 1st law of Thermodynamics, Assumptions of Kinetic theory of gases, mean free path phenomenon, perfect gas equation, Vanderwaal's equation of state, Radioactive elements, law of radioactive decay, half life and average life of radioactive elements, Properties of α , β and γ radiation, Definition of nucleolus, Periodic table, Postulates of Bohr's theory of H atom, Hydrogen spectrum, Semiconductor, p and n type semiconductor, p-n junction diode, p-n-p and n-p-n transistor, rectifier, amplifier, photovoltaic effect, solar cell.

Subject :- Chemistry [15 Hours]

Physical Chemistry

Unit I State of Matter

1. The three states of matter 2. Intermolecular interaction 3. Hydrogen bonding 4. The gaseous state 5. Boyle's law, Charles law. 6. Gay Lussac's law, Avogadro law 7. Kinetic theory - molecular speeds 8. Liquid state 9. Vapour pressure 10. Surface tension 11. Viscosity.

Unit II Chemical Kinetics

1. Rate of reaction 2. Effect of concentration of reactant on rate of reaction. 3. Molecularity of elementary reactions 4. Effect of Temperature on rate of reaction (Arrhenius equation) 5. Effect of catalyst on rate of reaction.

Unit III Thermodynamics

1. Types of system, properties of system, state and state function, types of processes 2. Nature of heat and work. 3. Internal Energy 4. 1st, 2nd and 3rd laws of thermodynamics 5. Enthalpy 6. Enthalpies of physical changes. 7. Thermochemistry 8. Spontaneous process.

Inorganic chemistry

Unit I Structure of Atom

Quantum number - i) Principal quantum number ii) Azimuthal quantum number iii) Magnetic quantum number iv) Spin quantum number, Shape of orbitals - a) s – orbital b) p – orbital c) d – orbital a) Aufbau principle b) Pauli's exclusion principle c) Hund's rule.

Unit II Periodic table

Periodic trends in properties of Elements - a) Atomic radius b) Ionization potential c) Electronegativity d) Ionic radius e) Density.

Unit III Nature of chemical bonds

1) Ionic bond 2) Covalent bond 3) Co-ordinate bond 4) Hybridization – sp , sp^2 , sp^3 , sp^3d^2 5) VSEPR Theory – Rules, e.g.- NH_3 , H_2O , CF_3

Organic Chemistry

Unit I Fundamentals of Organic Reaction Mechanism

1. Substrate, Reagents, Reactive intermediates – Formation and stability of Carbocation, Carbanion, and Carbon free radical 2. Types of Reagents- Electrophiles and Nucleophiles 3. Curved arrow notations, cleavage of bond-homolytic and heterolytic cleavage 4. Resonance effect, Inductive effect, Mesomeric effect and Steric effect 5. Types of reactions- Addition, Elimination, Substitution, and Rearrangement.

Concept of Aromaticity- Huckel's rule, classification of aromatic compounds, Heterocyclic compounds.

Reactivity and orientation, Electrophilic and Nucleophilic substitution reactions.

Unit II Hydrocarbons

1. Alkanes, Alkenes and Alkynes - Preparation methods and Chemical reactions. 2. Preparation methods and Chemical properties of aldehydes, ketones, esters, ethers, halides, alcohols and phenols.

Unit III Stereochemistry of Organic compounds

1. Optical isomerism, Geometrical isomerism and conformational isomerism.
2. R and S nomenclature, E and Z nomenclature.

Unit IV Biomolecules

1. Amino acids, Proteins, and Carbohydrates - Classification structures and Functions.
2. Nucleic Acids- DNA, RNA- Types, Structure and Functions.

Unit V Name Reactions

Clemmensen's reduction, Aldol condensation, Wolf –Kishner reduction, Cannizzaro reaction, Rosenmund reduction, Wurtz reaction, Kolbe's reaction, Gabriel Phthalimide synthesis, Hoffmann bromamide degradation, Gatterman-Koch reaction, Reimer-Tiemann reaction.

Subject :- Mathematics [15 Hours]

Unit I Tracing of Curves and Its Rectification

[10]

Introduction, Definition of Terms: Tangents, Normals, Curvature, Asymptotes, Singular Points, Procedure for tracing of curve given in Cartesian form, Common Curves, Some well known curves , Parametric representation of curves and tracing of parametric curves , Polar representation of curves and tracing of polar curves , Rectification of the curves , Length of the arc of a curve given by $y=f(x)$, Length of the arc of the curve given by $r=f(\theta)$

Unit II Mean Value Theorem and Indeterminate Forms

[05]

Rolle's Theorem, Lagrange's Mean Value Theorem (L.M.V.T.) , Cauchy's Mean Value Theorem (C.M.V.T.)

Subject :- Electronics [15 Hours]

Unit I Circuit Analysis and Two Port Network:

[08]

Concept of two port network, Introduction to network parameters, Star and Delta networks, Star-Delta conversion, Millman's Theorem.

Unit II Voltage Regulators and Filters:

[07]

Three Pin IC regulators: Block diagram, fixed and variable voltage regulator ICs. Study of IC LM358, Concept of SMPS, Active low pass and high filters.

Subject :- Statistics

[15 Hours]

Unit I Statistical Methods:

[2]

Definition and scope of Statistics, concepts of statistical population and sample. Data: quantitative and qualitative, attributes, variables, scales of measurement- nominal, ordinal, interval and ratio. Presentation: tabular and graphical, including histogram and ogives.

Unit II Descriptive Statistics:

[2]

Measures of Central Tendency, Measures of Dispersion, Measures of Skewness and Kurtosis, Theory of Attributes.

Unit III Bivariate data:

[2]

Definition, scatter diagram, simple, partial and multiple correlations (3 variables only), rank correlation. Simple linear regression, principle of least squares.

Unit IV Probability:

[3]

Introduction, random experiments, sample space, events and algebra of events. Definitions of Probability – classical, statistical and axiomatic. Conditional Probability, laws of addition and multiplication, independent events, theorem of total probability, Baye's theorem and its applications.

Unit V Random variables:

[2]

Discrete random variables, p.m.f. and c.d.f., illustrations and properties of random variables, Two dimensional random variables: discrete joint, marginal and conditional p.m.f and c.d.f., independence of variables.

Unit VI Mathematical Expectation and Generating Functions:

[2]

Expectation of single and bivariate random variables and its properties. Moments, Conditional expectations

Unit VII Some Standard probability distributions:

[2]

Binomial, Hyper geometric, Poisson, Geometric, Negative binomial.

Subject :- Botany [15 Hours]

Unit I Biodiversity and its Conservation [2]

Plant biodiversity with respect to major groups of Plant kingdom, Plant taxonomy or Systematic Botany. Importance and function of Taxonomy

Unit II Plant anatomy [2]

Study of tissues – a. Meristematic , b. Simple tissue- Parenchyma, Collenchyma and Sclerenchyma, Complex Tissue – Xylem and Phloem

Unit III Cytology [2]

Types of cell and its Organization. (Prokaryotic and Eukaryotic), Mitosis and Meiosis

Unit IV Plant [4]

Mineral nutrition (a. Macronutrients b. Micronutrients), Photosynthesis and Respiration, (a) Photosynthesis- Ultra structure of Chloroplast, Light and Dark reaction, (b) Respiration – Types - Aerobic and Anaerobic, Ultra structure of Mitochondria, Cellular, Respiration

Unit V: Plant Ecology [5]

Ecological factors – Abiotic and Biotic, Biogeochemical cycles –Nitrogen cycle and Water cycle

Subject :- Zoology [15 Hours]

Unit I General characters of following [4]

Kingdom Protista , Phylum Porifera, Phylum Cnidaria, Phylum Platyhelminthes, Phylum Nematelminthes, Phylum Annelida , Phylum Arthropoda , Phylum Mollusca, Phylum Echinodermata

Unit II General characters of following [3]

Pisces, Amphibia, Reptiles , Aves , Mammals

Unit III General Introduction of [4]

Integumentary system, Skeletal system, Digestive system, Respiratory system , Circulatory system, Urinogenital system , Nervous system , Sense organs

Unit IV Brief account of Gamatogenesis, blocks to polyspermy [2]

Unit V Human placenta &function ,other types of placenta on the basis of histology [2]

Subject :- Microbiology [15 Hours]

Unit I

[7]

Water Microbiology. Source of microorganism in water, Faecal pollution of water, Indicator of Faecal pollution- E. coli, Routine bacteriological analysis of water, SPC, Test for Coliforms, Qualitative test Presumptive, Confirm, Completed test, Quantitative – MPN, Membrane filter techniques.

Unit II

[8]

Milk microbiology, General composition of milk, Source of contamination of milk, Microbial examination of milk – SPC and Dye reduction, Spoilage of milk – Change in color and flavor, Pasturization

Subject :- Computer Science [15 Hours]

Unit I

Conditional Statements: if, if-else, nested if –else

5H

Looping: for, while, nested loops, else clause with while and for loop

Control statements: Terminating loops, skipping specific conditions(break, continue, pass), **Numeric Functions, String Manipulation**

Lists: Creating a list, Displaying list(print()), Basic Operation Iteration (for var in list), Slicing, Updating(=) and deleting(del) element of a list. Compare (cmp()), Maximum(max()) and minimum (min()), List Methods

Tuples (sequence of immutable objects) : Creating tuples(using () brackets) and Deleting tuple(del), empty tuple, Displaying(print()), Basic Operation

Unit II

Dictionaries – Concept of dictionary, Creating Dictionary ({Key:Value,...}), 5H Values are mutable objects but keys are immutable object, Properties of Dictionary keys, Basic Operation(Length (len()), Compare (cmp())), Dictionary Methods

Functions: Defining Functions(def, name, arguments, :, function suite, return statement), calling a function

Algorithm, Searching and Sorting – Searching(Linear, Binary) and sorting techniques (Bubble, Insertion, Merge), Efficiency of algorithms

Python File Input-Output: Opening and closing file, Various types of file modes, reading and writing to files

Unit III

ER to The Relational Model ,Introduction to Functional Dependencies 5H and Normalization –1NF, 2NF, 3NF, BCNF

Relational Algebra: operations (selection, projection, set operations union, intersection, difference, cross product, division, Joins –conditional, equi join and natural joins), **MySQL Joining Tables** – inner join, outer join (left outer, right outer, full outer), **Database Protection:** Security Issues, Threats to Databases, Security Mechanisms, Role of DBA, Discretionary Access Control

MySQL – Stored functions, procedures, cursor, trigger, views (creating, altering dropping, renaming and manipulating views)

Text books:

- 1) Charles Dierbach, *Introduction to Computer Science using Python*, Wiley, 2013
- 2) James Payne , *Beginning Python: Using Python 2.6 and Python 3*, Wiley India, 2010
- 3) Paul Gries , Jennifer Campbell, Jason Montojo, *Practical Programming: An Introduction to Computer Science Using Python 3*, Pragmatic Bookshelf, 2/E 2014

Additional References:

1. Paul Gries , Jennifer Campbell, Jason Montojo, *Practical Programming: An Introduction to Computer Science Using Python 3*, Pragmatic Bookshelf, 2/E 2014
2. Adesh Pandey, *Programming Languages – Principles and Paradigms*, Narosa, 2008
3. A. Lukaszewski, *MySQL for Python: Database Access Made Easy*, Pact Publisher, 2010