Syllabus for Higher Secondary Education in ENGLISH for +2 Arts, Science and Commerce Stream. (2016 Admission Batch) +2 2nd year (Detailed Syllabus)

SECOND YEAR

Units -I Prose

Unit -II Poetry

Sl. No.		**Units**
i.	Indian Children Speak (Juanita Bell)	vi.
ii.	The Goat Paths (James Stephen)	vii
iii.	Of a Questionable Conviction (Jayanta Mahapatra)	viii
iv.	Mirror (Sylvia Plath)	ix
v.	Toads (Phili'p Larkin)	x

Short Stories

Units to be studied :

Sl. No.		**Units**
i.	The Happy Man (W.S.Maugham)	xiv
ii.	The Tree (Manoj Das)	xv
iii.	The Watch Man (R.K.Narayan)	xvi

One Act Plays

Units to be studies

Sl. No.		**Units**
i.	The Hour of Truth (Pefciva! Wilde)	xix

C. GRAMMAR & USAGE

i. Revision of Tense and Aspect'

ii. Revision of Prepositions and Phrasal Verbs .

iii. Clause-types

iv. Linking Devices

v. Word Order and Emphasis

Books Prescribed : Approches to English-I

Approches to English-II

Published by - **O**disha State Bureau of Textbook Preparation & Production,Pustak Bhavan Bhubaneswar.

QUESTION PATTERN AND DISTRIBUTION OF MARKS
ALTERNATIVE ENGLISH +2 2ND YEAR

FULL MARK-100 TIME-3 Hrs

1. Reading Comprehension.

a) A prescribed prose piece or extract 10 Marks
(5 questions including inferential questions are to be answered).

b) A prescribed poem / extract
(5 questions including inferential questions and those on poetic devices, figures of speech, mode, tone and style etc.) 10 Marks

c) A prescribed story / one-act play or its extract
(5 questions including Inferential questions and those on literary devices, tone etc.) 10 Marks

d) An unseen passage of at least 200 words. 10 Marks
(5 questions including inferential ones)

2. Reading related skills.

a) Un Guided note making based on the passage 1 (d) 10 Marks

3. Writing skills.

a) Designing and writing a brochure 10 Marks

b) Writing dialogues of a face-to-face / telephonic conversation. 10 Marks

c) Rewriting a poem/short story as a different form of discourse i.e. a page of a diary, a newspaper report/article or a script for a play etc. 10 Marks

d) Adding a suitable beginning/ending/title to a given poem/story. 5 Marks

4. Grammar and usage(in context)

(3 questions on the prescribed grammar units including modified close tests 15 Marks

ENVIRONMENTAL EDUCATION
(Compulsory)

F.M. 70

Theory.

Unit - I Man and Environment
Unit - II Environmental Pollution
Unit -III Environmental Management
Unit -IV Road Safety.

THEORY

P.M. : 70

UNIT - I **8 Periods**

(A) Man and Environment: Environment: Components: -

Atmosphere, Lithosphere, Hydrosphere and Biosphere- Human being as a rational social partner in environmental action - Impact of human activities on environment - Environmental Problems of urban and rural areas- Stress on civic amenities: supply of water, electricity, transport and health services.

(B) Natural Resources **6 Periods**

Land, water, forest as primary natural resources- Fresh water and Marine resources- Natural resources of Orissa - Concept of Biodiversity and its conservation - Renewable and non-renewable resources - Conventional and non - conventional energy.

UNIT - II **6 Periods**

Environmental Pollution:

Types of pollution;and pollutants-Causes, effects and control of air pollution, water pollution,

soil pollution and noise pollution, Green house effect, Global Warming, Eutrophication, Ozone layer depletion.

UNIT - III **6 Periods**

(A) Environmental Management:

Scope, of Environmental Management -Management of solid, liquid and gaseous wastes - Resource Management- disaster Management (flood, cyclone and earthquake) - Concept of sustainable development-Management of agricultural produce.

(B) Environmental Laws: **5 Periods**

Constitutional Provisions .-Major provisions of Environmental Laws and Pollution Control Laws with particular reference to the Water Act, 1974, the Air Act, 1981, the E(P) Act 1986, CPCB and SPCB- (Central and State'Pollution Control Boards).

UNIT - IV **5 Periods**

Road Fafety

a) Concept & Need

b) Traffic signs

c) What to do and what not to do while on the road - safety guidelines offence and penalties.

d) Traffic Management: RTO, MVI, Police / Traffic Police

e) Traffic Awareness.

PROJECTS

F.M. : 30

1. To study the changes that have taken place in the given land area of a city,village/locality/ market during the last five years in respect of at least five parameters like number of houses^ residents and families; food habits, number of household goods in a family, consumption of water, electricity and fuel including that of personal vehicles by a family, sources of noise (public address systems being used, television, radio and vehicles on the road), common facilities like number of schools, hospitals, shops, theatres, public conveyance, public utilities, public transport, number of factories, industries and/or the facilities for production and processing of goods, loss of water bodies, types and quantity of wastes, their disposal and treatment facilities with a view to discuss the patterns of changes and impact on the environment and quality of life. One specific project on these aspects may be selected to study the changes that have taken place in a given area during the last five years in respect of the number of houses, residents and families and to prepare a report on the effects on civic amenities like availability of water, electricity and fuel; the drainage system, disposal of wastes including night soil,
2. To study the environmental profile of a town/ locality/village in respect of population density, green cover, educational level of residents, social problems and sources of pollution and their effect on air, water and soil.
3. To collect data on monthly consumption of electricity and fuel from at least five families, any two commercial establishments and four public utilities in a given locality. To plan strategies for educating consumers to economise on the consumption of electricity and fuel by reducing their over-use, misuse and improper use.
4. To study, for a period of one month, the status of sanitary conditions and methods of waste disposal of a given locality vis-a-vis the role of Panchayat, Municipality or

Corporation and to prepare an action plan for making the conditions more environment friendly.

5. To investigate the impact of an industry or a large manufacturing unit o'n the local environment. The parameters could be land use, the ratio of the covered area and the open space, the raw materials used for production, inputs like electricity and water, the types of waste generated and the modes of waste disposal, use,of environment friendly and efficient technology, types of pollutants emitted or discharged, the average health status of the employees and residents in the area.

6. To study the impact of changes in agricultural practices or animal husbandry including poultry, piggery, fishery and apiculture over a period of time on the local environment of a given locality or village. The components for analysis may include: types of crops, land area under cultivation, mechanisation, use of electricity, mode of irrigation and agrochemicals, agro-waste and their disposal, types of animal breed and their feed, types of shelter and healthcare, methods of preservation and processing of products and animal wastes and their disposal. To suggest an action plan for modifying the prevailing practices so as to make them environment friendly and sustainable.

7. To collect samples of water from different sources and study their physical characteristics like turbidity, colour, odour, the measure of pH, the nature of suspended and dissolved impurities and pollutants, the presence of toxic materials like mercury, lead, arsenic, fluorine and the presence of living organisms. For testing the presence of toxic materials and living organisms, the help of a local laboratory or institution may be taken, if available. To identify the most polluted sample of water and locate the sources of its pollution. To devise an action plan for mobilising public opinion for checking the pollution.

8. To study the practices followed in the region for storage, preservation, transportation and processing of perishable or non- perishable farm products and to assess the extent of their wastage due to faulty practices.

9. To prepare a status report on the prevalence of child labour in a given area through sample surveys on children engaged as domestic help and as workers in farms, commercial establishments and manufacturing units: The survey may be in respect of age group, education, wages, working hours, working conditions, safety in works place, health, handling hazardous materials and the like. Units dealing with hazardous materials and processes may be identified and an action plan for mobilising public opinion against,the practice of child labour may be prepared.

10. To conduct a survey of plants in a locality and to collect information about their cultural, economic and medicinal values from the local people and the available literature. To prepare an action plan for their propagation.

11. Road Safety Project.

(i) To conduct a survey on Traffic Offences and student initiatives to check it.

(ii) To prepare a status report on the prevalence of Traffic - problems in a given area.

(iii) To suggest an action plan for prevention of road accidents,

(iv) To suggest the use of efficient technology for better traffic management.

Environmental Education will be assessed at the college level for 100 marks (70 marks for theory and 30 marks for project work) before Test Examination of the college for Annual

Higher Secondary Examinationand the grades (A +a, B, C, D, in order of merit) are to be awarded by the college and the same shall be recorded in the body of the pass certificate given by the council subsequently. The grade secured in the Environmental Education (EE) will not affect the result of the candidate.

Mark	Grade
70% and above	Gr A+
60% to 69%	Gr A
50% to 59%	Gr B
35% to 49%	Gr C
Below 35%	Gr D

BOOK PRESCRIBED:

Bureau's Higher Secondary (+2) Environmental Education, Published by Odisha State Bureau of Textbook Preparation & Production, Bhubaneswar.

YOGA

(Theory)
+2 1st year

Full Marks - 50 Time 2 hrs.

Unit- I **10 marks**

CONCEPT YOGA

Meaning. Definition and Scope of yoga, Importance and aim of yoga for the students, Misconception of Yoga

Yoga and Spirituality

Unit- II 10 marks

BASIC PRINCIPLES OF YOGA PRACTICE

Place, Time, Age, Diet, Dress, Do's and Don'ts

Power of Silence

Unit-III 10 marks

BRANCHES OF YOGA

Karma Yoga, Bhakti Yoga, Raja Yoga, Jnana Yoga

Yoga in Srimad Bhagavat Gita

Unit- IV 10 marks

CONCEPT OF ASTHANGA YOGA

Yama, niyama, asana, pranayama, pratyahara, dharana, dhyana and samadhi

Unit - V 10 marks

YOGA AND PERSONALITY DEVELOPMENT

Meaning, Definition of Personality

Dimension of Personality: physical, mental, emotional, intellectual and spiritual. Personality Development in relation to external world civic, social, patriotic and global consciousness. Concept of Personality According to swami Vivekananda and Sri Aurobindo.**(Practical)**

+2 2nd year ,

Full Marks - 50 Time 2 hrs.

Unit - I

ASANA

PRILIMINARY PRACTICES : Greeva Sanchalana, skandha chakra (shoulder rotation), purna, titali asana (full butterfly), marjari asana (car stretch pose), Surya Namaskara

STANDING POSTURE : Tadasana, tiryak tadasana, katichakrasana pada-hastasana, ardha chakrasana, ardhakati chakrasana, ekapada pranasmasana, garudasana, natarajasana.

SITTING POSTURE : padmasana janusirasana, paschimottanasana, supta vajrasana, shashankasana, ustrasana, ardhamatsyendrasana.

PRONE LYING POSTURE : shalabhasana, bhujangasana, dhanurasana.

SUPINE POSTURE : uttanapadasana, supta pawanamuktasana, naukasana, halasana, sarvangasana, matsyasana, chakrasana.

Unit-II

RELAXATION : savasana, yoganidra

Unit-III

PRANAYAMA : Priliminary practices: abdominal,
thoracic, clavicular and fullyogic breathing kapalabhati, nadisodhana, bhramari seetali/seetkari

Unit - IV and Unit - V

MEDITATION : Antarmouna - sensorial awareness : (sound, touch, vison, smell, taste), breath awareness, awareness of the spontaneous thought process.

Unit-V

KRIYA : Trataka (internal and external)

For +2 1st year 50 marks theory examination and For +2 2nd year 50 marks practical examination but in 1st year and 2nd year students will learn practical

The grade secured taking together both the theory and Project/Practical marks will be refelected iin the Marks sheet and the pass certificate of the Council.

Mark	Grade
70% and above	Gr A+
60% to 69%	Gr A
50% to 59%	Gr B
35% to 49%	Gr C
Below 35%	Gr D

Books Prescribed : An Introduction to Yoga,
Published by Odisha State Bureau of Textbook Preparation

BASIC COMPUTER EDUCATION

+2 1st Year

UNIT - I

Computer Fundamentals : Necessity and uses of computer, what is computer?, Computer as a system, problem and problem solving technique, Important terminology, Input-Output devices, types of computer, (Digital, Analog, Hybrid, Super computer, Main Frame, Mini, JC, Note Book, and Laptop). Generation of Computer, Computer Memory, (Main, Secondary, Virtual. Buffer, Cache,) Computer Languages and its types. **8 Hours**

UNIT - II

Operating System: types, software, Dos and Windows : Fundamentals and Commands, Security and Anti-virus

Introduction to MS_OFFICE :

MS-WORD: Creating a File, setting and typing text, page formatting, editing; printing, saving the files, creating Folders, Insertion tables and objects, Bulletin, Page Numbering., spell check, indenting;, paragraph setting and mail merge, CD writing.

MS-EXCEL: Spread sheet and its uses, an introduction, formatting work sheet, setting columns/ Rows, range, Format, protect, sorting, types of graphs, functions and formula, printing text, copying and saving the document.

MS-POWER POINT: Features, Uses, Menus, Toolbars, creating a presentation through auto context wizard, templates, manual slides show, saving, deleting, opening a presentation, Editing.

MS-ACCESS: Data base, database Management system, RDBMS, advantages and limitations of MS- Access, parts, tables, integrity constraints, relationship and designing tables.

5 Hours

UNIT - III

INTERNET AND COMPUTER SECURITY:

Introduction to Internet, net browsing, Emails, Networking and its types, topology, computer crime, components required for internet, saving and printing the web files.

APLLICATIONS: in Education, Medical Science, Business, Entertainment, Social ‘’service’s and Research etc. 7 hours

For +2 1st year 50 marks theory examination and For +2 2nd year 50 marks practical examination. TOTAL HOURS: 30 (THEORY) AND 10 HOURS (PRACTICAL).

+2 2nd Year

PRACTICALS:

DOS, Windows, MS-Office, web page, browsing, sending and creating a mail.

The grade secured taking together both the theory and Project/Practical marks will be reflected in the Marks sheet’ and the pass certificate of the Council.

Mark	Grade
70% and above	Gr A+
60% to 69%	Gr A
50% to 59%	Gr B
35% to 49%	Gr C
Below 35%	Gr D

CHEMISTRY

For Ist Year Science

Course Structure

Unit	Title	Marks
I	Basic Concepts of Chemistry	11
II	Structure of Atom	
III	Classification of Elements & Periodicity in Properties	4
IV	Chemical Bonding and Molecular Structure	
V	States of Matter : Gases and Liquids	
VI	Thermodynamics	21
VII	Equilibrium	
VIII	Redox Reactions	
IX	Hydrogen	16
X	s-Block Elements	
XII	Organic Chemistry : Basic Principles & Techniques	
XIII	Hydrocarbons	18
XIV	Environmental Chemistry	
	Total	70

Unit I: Some Basic Concepts of Chemistry

General Introduction: Importance and scope of chemistry

Nature of matter, laws of chemical combination, Dalton's atomic theory: concept of elements, atoms and molecules

Atomic and molecular masses and equivalent mass of elements, acid, base, and salt,oxidants,reductants, and mole concept and molar mass, percentage composition, empirical and molecular formula, chemical reactions, stoichiometry and calculations based on stoichiometry.

Unit II: Structure of Atom

Discovery of Electron, Proton and Neutron, atomic number, isotopes and isobars. Thomson's model and its limitations. Rutherford's model and its limitations, Bohr's model and its limitations, concept of shells and subshells, dual nature of matter and light, de Broglie's relationship, Heisenberg uncertainty principle, concept of orbitals, quantum numbers, shapes of s, p and d orbitals, rules for filling electrons in orbitals - Aufbau principle, Pauli's exclusion principle and Hund's rule, electronic cinfiguration of atoms, stability of half filled

Unit III: Classification of Elements and Periodicity in Properties

Significance of classification, brief history of the development of periodic table, modern periodic law and the present form of periodic table, periodic trends in properties of elements - atomic radii ionic radii, inert gas

radii, Ionization enthalpy, electron gain enthalpy, electronegativity, valency and oxidation state.Nomenciature of elements with atomic number greater than 100.

Unit IV : Chemical Bonding and Molecular Structure

Valence electrons, ionic bond, covalent bond; bond parameters, Lewis structure, polar character of covalent bond, covalent character of ionic bond, valence bond theory, resonance, geometry of covalent molecules, VSEPR theory, concept of hybridization, involving s.p and d orbitals and shapes of some molecules, molecular orbital theory of homonuclear diatomic molecules (qualitative idea only), hydrogen bond.

Unit V : States of Matter : Gases and Liquids

Three states of matter, intermolecular interactions, types of bonding, melting and boiling points, role of gas laws in elucidating the concept of the molecule, Boyle's law, Charles law, Gay Lussac's law, Avogadro's law, ideal behaviour, empirical derivation of gas equation, Avogadro's number, ideal gas equation. Deviation from ideal behaviour liquefaction of gases, critical temperature, kinetic energy and molecular speeds (elementary idea) Liquid State vapour pressure, viscosity and surface tension (qualitative idea only, no mathematical derivations).

Unit VI : Chemical Thermodynamics

Concepts of System and surroundings and types of system, surroundings, work, heat, energy, extensive and intensive properties, state functions.

First law of thermodynamics - internal energy and enthalpy, heat capacity and specific heat, measurement of ΔU and ΔH, Hess's law of constant heat summation, enthalpy of bond dissociation, combustion, formation, atomization, sublimation, phase transition, ionization, solution and dilution, Second law of Thermodynamics (brief introduction). Introduction of entropy as a state function, Gibb's energy change for spontaneous and non-spontaneous processes, criteria for equilibrium.

Third law of thermodynamics (brief introduction).

Unit VII : Equilibrium

Equlibrium in physical and chemical processes, dynamic nature of equlibrium, law of mass action, equilibrium constant (Kc, Kp and Kx and their relationship) factors affecting equilibrium - Le Chatelier's principle, ionic equlibrium-ionization of acids and bases, strong and weak electrolytes, degree of ionization, ionization of poly basic acid strength, concept of PH, Henderson Equation, hydrolysis of salts (elementary idea), buffer solution, solubility, product, common ion effect (with illustrative examples) numerical problems.

Unit VIII : Redox Reaction

Concept of oxidation and reduction, redox reactions, oxidation number, balancing redox reactions, in terms of loss and gain of electrons and change in oxidation number, applications of redox reactions.

Unit IX : Hydrogen

Position of hydrogen in periodic table, occurrence, isotopes, preparation, properties and uses of hydrogen, hydrides-ionic covalent and interstitial; physical and chemical properties of water, heavy water, hydrogen

peroxid-e-preparation, reactions and structure and use; hydrogen as a fuel.

Unit X : s-Block Elements (Alkali and Alkaline Earth Metals)

Group 1 and Group 2 Elements

General introduction, electronic configuration, occurrence, anomalous, properties of the first element of each group, diagonal relationship, trends in the variation of properties (such as ionization enthalpy, atomic and ionic radii), trends in chemical reactivity with oxygen and halogens, uses.

Preparation and Properties of Some Important Compounds :

Sodium Carbonate, Sodium Chloride, Sodium Hydroxide and Sodium Hydrogencarbonate, Biological importance of Sodium and Potassium.Calcium Oxide and Calcium Carbonate and their industrial uses, biological importance of Magnesium and Calcium.

Unit XI : Some p- Block Elements

General Introduction to p- Block Elements

Group 13 Elements : General introduction, electronic configuration, occurrence, variation of properties, oxidation states, trends in chemical reactivity, anomalous properties of first element of the group, Boron - physical and chemical properties, some important compounds, Borax, Boric acid, Boron Hydrides, Alumunium : Reactions with acids and alkalies, uses.

Group 14 Elements : General introduction, electronic configuration, occurrence, variation of properties, oxidation states, trends in chemical reactivity, anomalous behaviour of first elements. Carbon-catenation, allotropic forms, physical and chemical properties; uses of some important compounds: oxides. Important compounds of Silicon and a few use: Silicon Tetrachloride, Silicones, Silicates and Zeolites, their uses.

Unit XII : Organic Chemistry - Some Basic Principles and Technique

General introduction, methods of purification, qualitative and quantitative analysis, classification and IUPAC nomenclature of organic compounds. Electronic displacements in a covalent bond: inductive effect, electromeric effect, resonance and hyperconjugation. Homolytic and heterolytic fission of a covalent bond free radicals, carbocations, carbanions, electrophiles and nucleophiles, types of organic reactions.

Unit XIII : Hydrocarbons

Classification of Hydrocarbons

Aliphatic Hydrocarbons :

Alkanes - Nomenclature, isomerism, conformation (ethane only), physical properties methods of preparation chemical reactions including free radical mechanism of halogenation, combustion and pyrolysis.

Alkenes - Nomenclature, structure of double bond (ethene), geometrical isomerism, physical properties, methods of preparation, chemical reactions: addition of hydrogen, halogen, water, hydrogen halides (Markownikoff's addition and peroxide effect), ozonolysis, oxidation, mechanism of electrophilic addition.

Alkynes - Nomenclature, structure of triple bond (ethyne), physical properties, methods of preparation, chemical reactions : acidic character of alkynes, addition reaction of - hydrogen, halogens, hydrogen halides and water.

Aromatic Hydrocarbons : Introduction, IUPAC nomenclature, benzene : resonance, aromaticity, chemical properties: mechanism of electrophilic substitution, nitration, sulphonation, halogenation, Friedel Craft's alkylation and acylation, directive influence of functional group in monosubstituted benzene. Carcinogenicity and toxicity.

Unit XIV : Environmental Chemistry

Environmental pollution - air, water and soil pollution, chemical reactions in atmosphere, smog, major atmospheric pollutants, acid rain, ozone and its reactions, effects of depletion of ozone layer, greenhouse effect and global warming-pollution due to industrial wastes, green chemistry as an alternative tool for reducing pollution, strategies for control of environmental pollution.

CHEMISTRY (PRACTICAL)

+2, 1st Year Science

(Detailed syllabus)

Experiments :

1. Basic Laboratory Techniques : (Non-evaluative)

a) Bunsen burner (different parts and their functions)

b) Chemical balance - weighing with chemical balance by equal oscillation method.

c) Cutting and bending of glass tube, drawing jet and boring a cork.

2. Crystallisation :

Preparation of $CuSO_4$, $5H_2O$ crystal from $CuCO_3$.

3. Qualitative Analysis :

a) Identification of acid radicals :

Radicals : CO_3^{2-}, SO_3^{2-}, S^{2-}, NO^{2-}, Cl^-, Br^-, I^-, NO_3^-, SO_4^{2-} & PO_4^{3-}

b) Identification of Basic Radicals :

Radicals : Ag^+, Pb^{2+}, Hg_2^{2+}, Cu^{2+}, Hg^{2+}, Bi^{3+}, As^{3+}, Sb^{3+}, Sn^{2+}, Al^{3+}, Fe^{3+}, Cr^{3+}, Co^{2+}, Ni^{2+}, Zn^{2+}, Mn^{2+}, Ba^{2+}, Sr^{2+}, Ca^{2+}, NH^{4+}, Mg^{2+}, K^+ and Na^+ (Dry Tests only).

4. Volumetric Analysis :

Single titration of acids and bases (three experiments to be done; one on direct determination of normality of one of the solutions from that of the other and the other two, involving numerical calculations)

5. Gravimetric Analysis :

a) Equivalent mass of Mg by hydrogen displacement method.

b) Solubility of K_2SO_4 at room temperature.

Books Recommended :

+2 Practical Chemistry, Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar

QUESTION PATTERN AND DISTRIBUTION OF MARKS

CHEMISTRY (PRACTICAL)

+2, 1st year Science

Full Mark : 30 **Time : 3 Hrs**

1.	**Salt analysis (Acid radical)**	**-**	**-**	**10 marks**
	Dry Test	**-**		**04 mark**
	Wet Test	**-**		**06 mark**
2.	Crystallisation / Single titration / Equivalent mass / Solubility	-	-	10 marks
3.	Viva-Voce	-	-	06 marks
4.	Record	-	-	04 marks

CHEMISTRY
for 2nd year Science

Course Structure

Unit	**Title**	**Marks**
I	Solid State	
II	Solutions	
III	Electrochemistry	23
IV	Chemical Kinetics	
V	Surface Chemistry	
VI	Isolation of Elements	
VII	p-Block Elements	
VIII	d- and f- Block Elements	19
IX	Coordination Compounds	
X	Haloalkanes and Haloarenes	
XI	Alcohols, Phenols and Ethers	
XII	Aldehydes, Ketones and Carboxylic Acids	
XIII	Organic Compounds containing Nitrogen	28
XIV	Biomolecules	
XV	Polymers	
XVI	Chemistry in Everyday Life	
Total		**70**

Unit I: Solid State

Classification of solids based on different binding forces: molecular, ionic, covalent and metallic solids, amorphous and crystalline solids (elementary idea). Unit cell in two dimensional and three dimensional lattices, calculation of density of unit cell, packing in solids, packing efficiency, voids, number of atoms per unit cell in a cubic unit cell, point defects, electrical and magnetic properties.

Band theory of metals, conductors, semiconductors and insulators and n & p type semiconductors.

Unit II: Solutions

Types of solutions, expression of concentration of solutions of solids in liquids, solubility of gases in liquids, solid solutions, colligative properties - relative lowering of vapour pressure, Raoult's law, elevation of boiling point, depression of freezing point, osmotic pressure, determination of molecular masses using colligative properties, abnormal molecular mass, van't Hoff factor.

Unit III: Electrochemistry

Redox reactions, electrolytes and non-electrolyte conductor, conductance in electrolytic solutions, specific and molar conductivity, variation of conductivity with concentration, Kohlrausch's law, electrolysis and laws of electrolysis (elementary idea), dry cell electrolytic cells and Galvanic cells, lead accumulator, EMF of a cell, standard electrode potential, Nernst equation and its application to chemical cells, Relation between Gibbs energy change and emf of a cell, fuel cells, corrosion.

Unit IV: Chemical Kinetics

Rate of a reaction (Average and instantaneous), factors affecting rate of reaction: concentration, temperature, catalyst, order and molecularity of a reaction, rate law and specific rate constant, integrated rate equations and half life (only for zero and first order reactions), concept of collision theory (elementary idea, no mathematical treatment). Activation energy, Arrhenius equation.

Unit V: Surface Chemistry

Adsorption - physisorption and chemisorption, factors affecting adsorption of gases on solids, catalysts, homogenous and heterogenous activity and selectivity; enzyme catalysts colloidal state distinction between true solutions,colloids and suspension; lyophilic, lyophobic multimolecular and macromolecular colloids; properties of colloids; Tyndall effect, Brownian movement, electrophoresis, coagulation, emulsion - types of emulsions.

Unit VI: General Principles and Processes of Isolation of Elements

Principles and methods of extraction - concentration, oxidation, reduction - electrolytic method and refining; occurrence and principles of extractionof aluminium, copper, zinc and iron.

Unit VII: p - Block Elements

Group15 Elements: General introduction, electronic configuration, occurrence, oxidation states, trends in physical and chemical properties; nitrogen preparation properties & uses; compounds of nitrogen, preparation and properties of ammonia and nitric acid, oxides of nitrogen (Structure only); Phosphorus - allotropic forms, compounds of phosphorus: preparation and properties of phosphine, halides PCl_3, PCl_5 and oxoacids (elementary idea only).

Group 16 Elements: General introduction, electronic configuration, oxidation states, occurrence, trends in

physical and chemical properties, dioxygen: Preparation, Properties and uses, classification of oxides, Ozone, Sulphur 0 allotropic forms; compounds of sulphur: Preparation properties and uses of sulphur - dioxide, sulphuric acid: industrial process of manufacture, properties and uses; oxoacids of sulphur (Structures only).

Group 17 Elements: General introduction, electronic configuration, oxidation states, occurrence, trends in physical and chemical properties; compounds of halogens, Preparation properties and uses of chlorine and hydrochloric acid,interhalogen compounds, oxoacids of halogens (structure only).

Group 18 Elements: General introduction,electronic configuration, occurrence, trends in physical and chemical properties, uses.

Unit VIII: d and f Block Elements

General introduction, electronic configuration, occurrence and characteristics of transition metals, general trends in proerties of the first row transition metals - metallic character, ionization enthalpy, oxidation states, ionic radii, colour, catalytic property, magnetic properties, interstitial compounds, alloy formation, preparation and properties of $K_2cr_2O_7$ and $KMnO_4$.

Lanthanoids - Electronic configuration, oxidation states, chemical reactivity and lanthanoid contraction and its consequences.

Actinoids - Electronic configuration, oxidation states, chemical reactivity and lanthanoid contraction and its consequences.

Actinoids - Electronic configuration, oxidation states and comparison with lathanoids.

Unit IX: Coordination Compounds

Coordination compounds - Introduction, ligands, coordination number, colour, magnetic properties and shapes, IUPAC nomenclature of mononuclear coordination compounds. Bonding, Werner's therory, VBT and CFT; structure and stereoisomerism, importance of coordination compounds (in qualitative analysis, extraction of metals and biological system).

Unit X: Haloalkanes and Haloarenes

Haloalkanes: Nomenclature, nature of C-X bond, physical and chemical properties, mechanism of substitution reactions, optical rotation.

Haloarenes: Nature of C - X bond, substitution reactions (Directive influence of halogen in monosubstituted compounds only.

Uses and environmental effects of - dichloromethane, trichloromethane, tetrachloromethane, iodoform, freons, DDT, BHC.

Unit XI: Alcohols, Phenols and Ethers

Alcohols: Nomenclature, methods of preparation, physical and chemical properties (of primary alcohols only), identification of primary, secondary and tertiary alcohols, mechanism of dehydration, uses with special reference to methanol and ethanol.

Phenols: Nomenclature, methods of preparation, physical and chemical properties, acidic nature of phenol,

electrophillic substitution reactions, uses of phenols.

Eithers :Nomenclature, methods of preparation physical and chemical properties uses.

Unit XII : Aldehydes, Ketones and Carboxylic Acids

Aldehydes and Ketones : Nomenclature nature of carbonyl group methods of preparation, physical and chemical properties, mechanism of nucleophillic addition reactivity of alpha hydrogen in aldehydes uses.

Carboxylic Acids : Nomenclature, acidic nature, methods of preparation, physical and chemical properties uses.

Unit XIII : Organic compunds containing Nitrogen

Amines : Nomenclature classification, structure, methods of preparation, physical and chemical proporties, uses identification of primary, secondary and teritary amines.

Cyanide and Isocyanides-will be mentioned at relevant places in context

Diazonium salt - Preparation, chemical reactions and importance in synthetic organic chemistry.

Unit XIV : Biomolecules

Carbohydrates - Classification(aldoses and ketoses) Monosaccahrides(glucose and fructose), D-L configuration oligosaccharides(sucrose, lactose, maltose) polysaccharides(starch, cellulose, glycogem) importance.

Proteins-Elementary idea of l- amino acids, peptide bond, polypeptide, proteins, structure of proteins-primary secondary, teritary structure and quaternary structure(qualitative idea only), denaturation of proteins, enzymes, hormones-Elementary idea excluding structure

Vitamins-Classification and functions

Nucleic Acids : DNA and RNA

Unit XV: Polymers

Classification-Natural and synthetic methods of polymerization(addition and condensation)co polymerization, some important polymers, natural and synthetic like polythene, nylon, polyester, bakelite, rubber, Biodegradable and non-biodegradable polymers.

Unit XVI : Chemistry in Everyday life

Chemical in Medicines- Angesics, traqulizers antiseptics, disinfectants, antimicrobials, antifertility, drugs, antibiotics, antacids, antihistamines.

Chemical in food-Preservations, artificial sweetening agents, elementary idea of antioxidants

Clensing agents-Soap and detergents, cleansing action.

CHEMISTRY (PRACTICAL)

+2, 2nd Year Science

(Detailed syllabus)

1. Crystallisation

a) Preparation of Mohr's Salt ($FeSO_4$, $(NH_4)_2SO_4$, $6H_2O$] crystal

b) Preparation of potash alum [K_2SO_4, $Al_2(SO_4)_3$, $24H_2O$] crystal

2. Quantitative Analysis :

a) Double titration : Two experiments to be done - i) one acid two alkalis double titration and ii) two acids one alkali double titration.

b) Bench Acid Titration : Strong acid of approximately 2.0 N be supplied.

c) Redox Titration : Titration between potassium permanganate and oxalic acid.

3. Qualitative Inorganic Analysis :

Wet tests for basic radicals : Wet tests for the following basic radicals be done.

Group-I basic radicals : Ag^+, Pb^{2+}, Hg_2^{2+}

Group-II basic radicals : Hg^{2+}, Cu^{2+}, Bi^{3+}, As^{3+}, Sb^{3+}, Sn^{2+} & Sn^{4+}

Group-IIIA basic radicals : Fe^{3+}, Al^{3+} & Cr^{3+}

Group-IIIB basic radicals : Co^{2+}, Ni^{2+}, Zn^{2+} & Mn^{2+}.

Group-IV basic radicals : Ba^{2+}, Ca^{2+} & Sr^{2+}

Group-V basic radicals : NH_4^+, Mg^{2+}, K^+, Na^+. Identification of unknown basic radicals.

[For Identification of unknown basic radicals both dryand wet tests are to be performed]

4. Qualitative Organic Analysis :

Tests for unsaturation, distinction between aromatic and aliphatic compounds by copper foil test, tests for carboxylic, phenolic, aldehydic, ketonic and alcoholic groups.

Book Recommended

+2 Practical Chemistry : Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar.

QUESTION PATTERN AND MARKS DISTRIBUTION

CHEMISTRY (PRACTICAL)

+2, 2nd year Science

Full Mark : 30 **Time : 3 Hrs**

1.	**Salt analysis (Identification of basic radical only)**			**10 marks**
	Dry Test	-	04 mark	
	Wet Test	-	06 mark	
2.	Crystallisation / Double Titration / Bench Acid Titration OR Redox Titration		06	10 marks
	Organic compound		04	
3.	Viva-Voce	-	-	06 marks
4.	Record	-	-	04 marks

Boks Prescribed :Bureau's Higher Secondary (+2) CHEMISTRY, VOL-I &II

Published by - **O**disha State Bureau of Textbook Preparation & Production,Pustak Bhavan Bhubaneswar.

Biology

Ist year Science(Theory)

Unit I : Diversity in living world

Unit II: Structural organization in animals and plants

Unit III: Cell structure and function

Unit IV: Plant physiology

Unit V: Human physiology

Biology

2nd year Science(Theory)

Unit I: Reproduction

Unit II: Genetics and Evolution

Unit III: Biology and Human Welfare

Unit IV: Biotechnology and its applications

Unit V: Ecology and Environment

Question Pattern (Section A-Botany; Section B-Zoology)

Time : 1.5 hrs Full Marks : 35

Group: A

1. Multiple choice/ one word answer : 1 mark x 5 = 5 marks
2. Correct sentence/ Fill up blanks : 1 mark x 5 = 5 marks

Group: B

3. Answer within 3 sentences : 2.5 marks x 3 = 7.5 marks
4. Differentiate between : 3.5 marks x 1= 3.5 marks

Group: C

Answer two questions : 7 marks x 2 = 14 marks

Ist year Science(Theory)

Therory

I. Diversity in Living World (Periods 10)

a. What is living?, Biodiversity; Need for classification; Three domains of life; Taxonomy and Systematics; Concept of species and taxonomical hierarchy; Binomial nomenclature; Tools for study of Taxonomy- Museum, Zoos, herbaria, Botanical gardens.

b. Five Kingdom classification**;** Salient features and classification of Monera, Protista and Fungi into major groups; Lichens; Viruses and Viroids.

c. Salient features and classificatin of plants into major groups-Alagae, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms (three to five salient and distinguishing features and at least two examples of each category); Angiosperms- classification up to class, characteristic features and examples.

d. Salient features and classification of animals- non-chordates up to phyla level and chordates up to classes level (three to five salient features and at least two examples).

II. Structural Organization in Animals and Plants (Periods 12)

a. Morphology and modification in plants; Tissues; Anatomy and functions of different parts of flowering plants- Root, stem, Leaf; inflorescence- cymose and racemose; flower, fruit and seed (Tobe dealt along with the relevant practical of the Practical Syllabus).

b. Animal tissues (epithelial, connective, muscular, nervous); Morphology, anatomy and functions of different systems (digestive, circulatory, respiratory, nervous and reproductive) of an insect (cockroach). (Brief account only).

III.Cell Structure and Function

a. Cell theory and cell as the basic unit of life; Structure of prokaryotic and eukaryotic cell; Plant cell and animal cell; Cell envelope, cell membrance, cell wall; Cell organelles structure and function; Endomembrance system- endoplasmic reticulum, Golgi bodies, lysosomes, vacuoles; mitochondria, ribosomes, plastids, microbodies; Cytoskeleton,, cilia, flagella, centrioles (ultra structure and function); necleus' neclear membrance, chromatin, necleolus.

b. Chemical constituents of living cells: Biomolecules- structure and function of proteins, carbohydrates, lipid, nucleic acids; Enzymes-types, properties, enzyme action.

Cell division: Cell cycle, mitosis, meiosis and theirsignificance.

IV. Plant Physiology (Period 16)

a. Transport in Plants: Movement of water, gases and nutrients; Cell to cell transport- Diffusion, facilitated diffusion, active transport; Plant-water relations- Imbibition, water potential, osmosis, plasmolysis; Long distance transport of water- Absorption, apoplast, symplast,transpiration pull, root pressure and guttation; Transpiration Opening and closing of Stomata; Uptake and translocation of mineral nutrients, Transport of food, phloem transport, Mass flow hypothesis; Diffusion of gases (brief mention).

b. Mineral Nutrition: Exchange of gases; Cellular respiration- glycolysis, fermentation(anaerobic), TCA cycle and electron transport system (aerobic); Energy relation - Number of ATP molecules generated; Amphibolic pathways; Respiratory quotient.

c. Plant growth and Development: Seed germination; Phases of plant growth and plant growth rate; Conditions of growth; Differentiation, defifferentiation and redifferentiation; Sequence of developmental process in plant cell; Growth regulators-auxin, gibberellin, cytokinin,ethylene, Abscilic acid (ABA); Seed dormancy; Vernalisation; Photoperiodism.

V. Human Physiology (Periods 30)

a. Digestion and Absorption: Alimentary canal and digestive glands; Role of digestive enzymes and gastrointestinal hormones; Peristalsis, digestion, absorption and assimilation of proteins, carbohydrates and fats; Calorific value of proteins, carbohydrates and fats (brief account); Egestion; Nutritional and digestive disorders- PEM, indigestion,

constipation, vomiting, jaundice, diarrhea.

b. Breathing and Respiration: Respiratory organs in animals (tracheal, brancheal, cutaneous, pulmonary); Respiratory system in humans; Mechanism of respiration (breathing) and its regulation in humans- Exchange of gases, transport of gases, Respiratory volumes; Disorders related to respiration- Asthma, Emphysema, Occupational respiratory disorders.

c. Body fluids Circulation: Compositon of blood, blood groups, coagulation of blood; Composition of lymph and its function; Human circulatory system- Structure and working of human heart, blood vessels; Cardiac cycle, cardiac output, ECG; Double circulation; Regulation of cardiac activity. Disorders of circulatory system- Hypertension, Coronary artery diesease, Angina pectoris, Heart failure.

d. Excretory products and their elimination: Modes of excretion- Ammonotelism, ureotelism, uriocotelism; Human excretory system- structure and function; Mechanism of Urine formation, Osmoregulation: Regulation of kidney function- Reninangiotensin, Artial Natriuretic Factor, ADH and Diabetes insipidus; Role of other organs in excretion; Disorders- Uraemia, Renal failure, Renal calculi, Nephritis; Dialysis and artificial kidney.

e. Locomotion and Movement: Types of movement- ciliary, flagellar, muscular; Skeletal muscle- contractile proteins and muscle contraction; Skeletal system and its functions (To be dealt with the relevant practical of Practical Syllabus); Joints; Disorders of muscular and skeletal system- Myasthenia gravis, Tenany, Muscular dystrophy, Arthritis, Osteoporosis, Gout.

f. Neural control and Coordination: Neuron and nerves; Nervous system in humans- central nervous system (brain, spinal cord), peripheral nervous system and visceral nervous system; Generation and conduction of nerve impulse; Reflex action; Sensory perception; Sense organs; Elementary structure and function of eye and ear.

g. Chemical coordination and Regulation: Endocrine glands and hormones; Human endocrine system- Hypothalamus, Pitutary, Pineal, Thyroid, Parathyroid, Adrenal, Pancreas, Gonads; Mechanism of hormone action (Elementary Idea); Role of hormones as messengers and regulatror, Hypo- and hyperactivity and related disorders (Common disorders e.g. Dwarfism, acromegaly, cretinism, goiter, exopthlmic goiter, diabetes, Addison's disease).

(NB: Ib, c; IIa; III and IV units are to be taught by Botany Faculty. Ia, d; IIb; V units are to taught by Zoology Faculty.)

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QUESTION PATTERN AND DISTRIBUTION OF MARKS
BIOLOGY- I Theory
+ 2 1st Year Science (For College Level Exam.)
Section A - Botany

Time : 1.5 hrs Full Marks : 35

Group A: (Objective Type - Compulsory)

Q1.- Multiple choice/ one word answer : 1 mark each x 5 = 5 marks

Q2.- Correct the sentences/ Fill up the blanks :1 marks each x 5 = 5 marks

Group B: (Short Answer Type)

Q3.- Answer within three sentences : 2.5 marks each x 3 =7.5 marks
(3 bits to be answered out of 6 bits)

Q4.- Differentiate between (3 important differences)
(1 bit to be answered out of 3 bits) : 3.5 marks = 3.5 marks

Group C: (LongAnswer Type)

Answer two questions out of four : 7.0 marks each x 2 = 14 marks

Section B - Zoology

Time : 1.5 hours **Full Marks : 35**

Group A: (Objective Type - compulsory)

Q1.- Multiple choice/ one word answer : 1 mark each x 5 = 5 marks

Q2.- Correct the sentences/ Fill upthe blanks :1 marks each x 5 = 5 marks

Group B: (Short Answer Type)

Q3.- Answer within three sentences : 2.5 marks each x 3 = 7.5 marks
(3 bits to be answered out of 6 bits)

Q4.- Differentiate between (3 important differences)
(1 bit to be answered out of 3 bits) : 3.5 marks = 3.5 marks

Group C: (Long Answer Type)

Answer two questions out of four : 7 marks each x 2 = 14 marks

N.B: Long answer type questions are to be set only from the portions underlined in the syllabus.

BIOLOGY-I (Botany Practical

+ 2 First year Science

Detailed syllabus

Study of:

1. Different parts of the Dissecting and Compound microscopes.
2. A typical Angiospermic plant.

Major experiment

3. Study and describe at least one common flowering plant from each of the following families (Malvacae, Solanaceae, Fabaceae and Liliacease) including dissection and display of floral whorls, and and other and ovary to show number of chambers.
4. Preparation and study of T.S. of dicot and monocot roots, and stem and leaf (Primary).
5. Study of mitotis in onion root tips.

Minor experiment:

6. Study of cells (Onion scale leaf, *Rhoeo* leaves)
7. Test for presence of starch, proteins and fats.
8. Study of starch grains and raphides.

9. Qualitative test for catalase activity by leaf disc method.
10. Modification of root, stem and leaf.
11. Study of flower and its parts.
12. Types of inflorescence.

Spotting:

a. Study of the specimens and identification with reasons - bacteria, Oscillatoria, Spirogyra, Rhizopus, Mushroom, Yeast, Livewort, Moss, Fern, Cycas, one moncotyledonous plant, one dicotyledonous plan and one lichen.
b. Study of tissues and diversity in shapes and sizes in plants (simple tissue, complex tissue) through temporary/permanent slides.

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BIOLOGY- I (Botany) Practical
+ 2 First Year Science (For College Level Exam)

Time : 2 hours Full Marsk : 15

1.	Major experiment (One)	: 7 marks
2.	Minor experiment (One)	: 3 marks
3.	Spotting (Three - two from bit a and one from bit b)	: 3 marks
4.	Record	: 12 marks
	Total	: 15 marks

Instruction:

1. All the above experiments should be conducted by individual students.
2. Questions for major and minor experiments are to be set by drawing lots.
3. For each major and minor experiment, candidates have to write the requirements as per the questions, which may be verified and signed by the external examiner only.
4. One observation for major experiment maybe verified and signed by the external examiner only.

BIOLOGY - I (Zoology) Practical
+2 First year Science
Detailed Syllabus

A. EXPERIMENTS/ OBSERVATIONS:

1. To test the presence of carbohydrate, protein and fat in suitable animal materials (qualitative only).
2. To test the presence of urea in urine/ given sample solution.
3. To test the presence of albumin in urine/ given samplesolution.
4. To test the presence of bile salts in urine/ given sample solution.

B. SPOTTINGS/ IDENTIFICATION:

a. Study of specimens and identification with reasons- Amoeba, Hydra, Sycon, Liver fluke, Earthworm, Leech, Cockroach, Prawn, silkworm, Honeybee, Snail and Starfish.
b. Study of squamous epithelium, muscle fibres and mammalian blood film; stages of mitosis and meiosis (temporary/ permanent slides).
c. Study and comment on the morphological adaptations of two animals (Tree frog, Bat)

found in terrestrial conditions and two animals (Flying fish, Turtle) found in aquatic conditions.

Book Recommended :

Bureau's Higher Secondary (+2) Zoology, Practical, Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar.

QUESTION PATTERN AND DISTRIBUTION OF MARKS

BIOLOGY - I (Zoology) Practical

+2 First year Science (For College Level Exam)

Time : 2 hours **Full marks : 15**

1. Experiment (One experiment to be set from A) : 07 marks
   Theory and Procedure - 03 marks
   Experiment, Observation and Results - 04 marks
2. Spotting (Four spots to be set from B) - 1.5 marks x 4 : 06 marks
   (Two from bit a, one from bit b and one from bit c)
3. Practical Record : 02 marks

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2nd Year Science

Theory

I. Reproduction

a. Reproduction in organism: Reproduction, a characteristic feature of all organisms for continuation of species; Modes of reproduction - Asexual and sexual; Asexual reproduction; Modes- Binary fission, sporulation, budding, gemmule formation, fragmentation; vegetative propagation in plants.

Sexual reproduction in flowering plants: Flower structure; Development of male and female gametophytes; Pollination-types, agencies and examples; Outbreeding devices; Pollen-Pistil interaction; Double fertilization; Post fertilization events Development of endosperm and embryo, Development of seed and formation of fruit; Special modes- apomixis, parthenocarpy, polyembryony; Significance of seed and fruit formation.

b. Human Reproduction: Male and female reproductive systems; Microscopic anatomy of testis and ovary; Gametogenesis- spermatogenesis 7 oogenesis; Menstrual cycle; Fertilisation, embryo development upto blastocyst formation, implantation; Pregnancy and placenta formation (Elementary idea); Parturition (Elementary idea); Lactation (Elemntary idea).

Reproductive health: Need for reproductive health and prevention of sexually transmitted diseases (STD); Birth control- Need and Methods, Contraception and Medical Termination of Pregnancy (MTP); Amniocentesis; Infertility and assisted reproductive technologies - IVF, ZIFT, GIFT (Elementary idea for general awareness).

II. Genetics and Evolution (Periods 20)

a. **Heredity and Variation:** Mendelian Inheritance; Deviations from Mendelism-Incomplete dominane, Co-dominance, Multiple alleles and Inheritance of blood groups, Pleiotropy; Elementary idea of polygenic inheritance; Chromosome theory of inheritance; Chromosomes and genes; Linkage and crossing over.

b. Sex determination- In humans, birds, honey bee; Sex linked inheritance- Haemophilia, Colour blindness; Mendelian disorders in humans- Thalasemia; Chromosomal disorders in humans- Down's syndrome, Turner's and Klinefelter's syndromes.

c. Molecular Basis of Inheritance: Search for genetic material and DNA as genetic material; Structure of DNA and RNA; DNA packaging; DNA replication; Central dogma; Transcription, Genetic code, Translation; Gene expression and regulation- Lac Operon; Genome and human genome project; DNA finger printing.

d. Evolution: Origin of life; Biological evolution and evidences for biological evolution (Paleontological, comparative anatomy, embryology and molecular evidence); Darwinism, Modern Synthetic theory of Evolution; Mechanism of evolution- Variation (Mutation and Recombination) and Natural Selection with examples, types of natural selection; Gene flow and genetic drift; Hardy-Weinberg's principle; Adaptive Radiation; Human evolution (in brief).

III. Biology and Human Welfare (Periods 08)

a. health and Disease: Pathogens; parasites causing human diseases (Malaria, Filariasis, Ascariasis, Typhoid, Pneumonia, common cold, amoebiasis, ring worm); Basic concepts of immunology- vaccines; Cancer, HIV and AIDS; Adolescence, drug and alcohol abuse.

b. Improvement in food production:

i) Plant breeding, tissue culture, single cell protein, Biofortification;

ii) Apiculture and Animalhusbandary.

c. Microbes in human welfare: In household food processing, industrial production, sewage treatment, energy generation and as biocontrol agents and biofertilizers.

IV. Biotechnology and its Applications (Periods 08)

a. Principles and process of Biotechnology: Genetic engineering (Recombinant DNA technology).

b. Application of Biotechnology in health and agriculture: Human insulin and vaccine production, gene therapy; Genetically modified organisms- Bt crops; Transgenic Animals; Biosafety issues- Biopiracy and patents.

V. Ecology and environment (Periods 12)

a. Organisms and environemnt: Habitat and niche; Population and ecological adaptations; population interactions-mutualism, competition, predation, parasitism; Population attributes-growth, birth rate and death rate, age distribution.

b. Ecosystems: Patterns, components; productivity and decomposition; Energy flow; Pyramids of number, biomass, energy; Nutrient cycling (carbon and phosphorous); Ecological succession; Ecological Services- Carbon fixation; pollination, oxygen release.

c. Biodiversity and its conservation: Concept of Biodiversity; Patterns of Biodiversity; Importance of Biodiversity; Loss of Biodiversity, conservation; Hotspots, endangered organisms, extinction, Red Data Book: Biosphere reserves, National parks and Sanctuaries.

Environmental issues: Air pollution and its control; Water pollution and its control; agrochemicals and their effects; Solid waste management; Radioactive waste management; Greenhouse effect and global warming; Ozone depletion; Deforestation; Any three case studies as success stories addressing environmental issues.

(NB: Ia, II a, c; III b (i), c and v units are to be taught by Botany Faculty. I b; II b; III a, b(ii); IV units are to be taught by Zoology Faculty.)

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QUESTION PATTERN AND DISTRIBUTION OF MARKS

BIOLOGY - II Theory

+ 2 Second Year Science

Section A - Botany

Time : 1.5 hours **Full Marks : 35**

Group A: (Objective Type- Compulsory)

Q1.- Multiple choice/ one word answer	: 1 mark each x 5	= 5 marks
Q2.- Correct the sentences/ Fill up the blanks	: 1 marks each x 5	= 5 marks

Group B: (Short Answer Type)

Q3.- Answer within three sentences	: 2.5 marks each x 3	= 7.5 makrs
Q4.- Difference between (3 important differences)		
(1 bit to be answered out of 3 bits)	: 3.5 marks	= 3.5 marks

Group C: (Long Answer Type)

Answer two questions out of four	: 7 marks x 2	= 14 marks

Section B - Zoology

Time : 1.5 hours **Full Marks : 35**

Group A: (Objective Type- Compulsory)

Q1.- Multiple choice/ one word answer	: 1 mark each x 5	= 5 marks
Q2.- Correct the sentences/ Fill up the blanks	: 1 marks each x 5	= 5 marks

Group B: (Short Answer Type)

Q3.- Answer within three sentences	: 2.5 marks each x 3	= 7.5 makrs
(3 bits to be answered out of 6 bits)		
Q4.- Difference between (3 important differences)		
(1 bit to be answered out of 3 bits)	: 3.5 marks	= 3.5 marks

Group C: (Long Answer Type)

Answer two questions out of four	: 7 marks x 2	= 14 marks

N.B: Long answer type questions are to be set only from the portions understand in the syllabus.

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BIOLOGY - II (Botany) Practical

+2 Second Year Science

Detailed Syllabus

Major Experiment:

1. Study of the effect of temperature and chemicals (ethanol, acetone, formaldehyde) on leading of pigments in beet root.

2. Study of plants pigments by paper chromatography.
3. Study of transpiration by Ganong's or Farmer's potometer.
4. Study of relation between transpiration and absorption by T/A apparatus.
5. Effect of different wave length of light on photosynthesis by Wilmott's bubbler.
6. Study of effect of dissolved carbondioxide on photosynthesis by Wilmott's bubbler.
7. Comparative study of rate of transpiration from upper and lower surface of dicot leaf.
8. Collect and study soil from at least two different sites and study them for texture, moisture content, pH and water holding capacity of soil. Correlate with the kinds of plants found in them.
9. Collect water from two different water bodies around you and study them for pH, clarity and presence of any living organisms.
10. Study the presence of suspended particulate matter in air at the two widely different sites.
11. Study of plant population density by quadrate method.
12. Study of plant population frequency by quadrate method.

Minor Experiments:

13. Study of pollen germination on a slide.
14. Study of distribution of stomata on upper and lower surface of a dicot and a monocot leaf.
15. Study of osmosis by potato osmometer.
16. Analysis of samples for verification of Mendelian ratio using Pea seeds or colour beads.
17. Study of plasmolysis.

Spotting:

18. Conditions necessary for seed germination.
19. Types of germination.
20. Phototropism/ Geotropism.
21. Morphological adaptation of hydrophyte and Xerophyte.

QUESTION PATTERN AND DISTRIBUTION OF MARKS

BIOLOGY - II (Botany) Practical

+ 2 Second Year Science

1.	Major experiment (One)	: 7 marks
2.	Minor experiment (One)	: 3 marks
3.	Spotting (Three)	: 3 marks
4.	Record	: 2 marks
	Total	: 15 Marks

Instruction:

5. All the above experiments should be conducted by individual student.
6. Questions for major and minor experiments are to be set by drawing lots.
7. For each major and minor experiments, candidates have to write the requirements as per their questions which may be verified and signed by the external examiner only.
8. One observation for major experiment may be verified and signed by the external examiner only.

BIOLOGY - II (Zoology) Practical
+2 Second year Science
Detailed Syllabus

A. EXPERIMENTS/ OBSERVATIONS:

1. To test the action of salivary amylase on starch; study the effects of pH and temperature on it.
2. To test the presence of urea sugar in urine/ given sample solution.
3. To determine the pH of three water samples collected from water bodies (using pH paper).
4. To study the prepared pedigree charts of genetic traits in man such as rolling of tongue, blood groups, widow's peak and colour blindness.

B. SPOTTINGS/ IDENTIFICATION:

a. Study of specimens and identification with reasons- Shark, Rohu, Frog, Garden lizard, Cobra, Krait, Pigeon and Rat.
b. TS/ VS through spinal cord, ovary, testis, artery, vein, kidney, stomach and blastula of frog.
c. Axial and appendicular skeleton of rabbit (excluding skull).
d. Identification of common disease causing organisms- Entamoeba, Plasmodium, Taenia, Ascaris and Ringworm (permanent slides/ specimens). Commenton the symptoms of the diseases they cause.

Book Recommended :

Bureau's Higher Secondary (+2) Zoology, Practical, Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar.

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QUESTIONS PATTERN AND DISTRIBUTION OF MARKS
BIOLOGY - II (Zoology) Practical
+ 2 Second Year Science

Time : 2 hours **Full Marks : 15**

1.	Experiment (One experiment to be set from A)		: 07 marks
	Theory and procedure	- 03 marks	
	Experiment, Observation and Results	- 04 marks	
2.	Spotting (Four spots to be set from B)	-1.5 marks each x 4	: 06 marks
3.	Practical Record		:02 marks

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EOGRAPHY SYLLABUS

+2 1ST YEAR (ARTS/SC)

Course Structure

Part/Unit	Topic of Chapter	Marks
Part A	**Fundamentals of Physical Geography**	**25**
Unit-1	Geography as a discipline	
Unit-2	The Earth	
Unit-3	Landforms	
Unit-4	Climate	
Unit-5	Water (Oceans)-OTBA	
Unit-6	Life on the Earth	
	Map and Diagram	5
Part B	**India - Physical Environment**	**25**
Unit-7	Introduction	
Unit-8	Physiography	
Unit-9	Climate, Vegetation and Soil	
Unit-10	Natural hazards and Disasters	5
Part C	**Map and Diagram Practical Work**	**30**
Unit-1	Fundamentals of Maps	10
Unit-2	Topographic and Weather Maps	15
	Practical Record Book and Viva	5

PART - A : FUNDAMENTAL OF PHYSICAL GEOGRAPHY
87 PERIODS

Unit-1 : GEOGRAPHY AS A DISIPLINE
04 PERIODS

- Geography as an integrating discipline, as a science of spatial attributes
- Branches of geography, physical geography and human geography
- Scope and Career option.

Unit-2 : THE EARTH
11 PERIODS

- Origin and evolution of the earth; interior of the earth.
- Wegener's continental drift theory and plate tectonics.
- Earthquake and volcanoes; cause type and effects.

Unit-3 : LANDFORMS
20 PERIODS

- Rocks: major types of-rocks and their characteristics.
- Landforms and their evolution.
- Geomorphic processes: weathering, mass wasting, erosion and deposition, soil formation.

Unit-4 : CLIMATE 30 PERIODS

- Atmosphere: composition and structure, elements of weather and climate
- Insolation-angle of incidence and vertical distribution o temperature; inversion of temperature.
- Pressure-pressure belts; winds-planetary, seasonal and local; air masses and fonts; tropical and extra tropical cyclones.
- Precipitation-evaporation; condensation-dew, frost, fog, mist and cloud, Rainfall-types and world distribution.
- World climates-classification (Koeppen and Thornthwaite), global warming and climatic changes.

Unit-5 : HYDROSPHERE

10 PERIODS

- Basics of oceanography.
- Oceans-distribution of temperature and salinity.
- Movement of ocean water-wave, tides and currents; sub marine reliefs.
- Ocean resources and pollution

Umt-6 : BIOSPHERE

07 PERIODS

- Biosphere-importance of plants and other organism; biodiversity and conservation: ecosystem and ecological balance

05 PERIODS

- Map work on identification of features based on 1 to 6 units on the outline/ physical/political map of the world.

Part-B : INDIA-PHYSICAL ENVIRONMENT

78 PERIODS

Unit-7 : INTRODUCTION

04 PERIODS

- Location, space relation, India's places in the world.

Unit-8 : PHYSIOGRAPHY

28 PERIODS

- Structure and relief; physiographic division (with special reference to odisha)
- Drainage system: concept of river basins, water sheed; the Himalayan and the peninsular rivers

Unit-9 : CLIMATE, VEGETATION AND SOIL

28 PERIODS

- Weather and climate-spatial and temporal distribution of temperature, pressure wind and rainfall, Indian monsoon: mechanism onset and withdrawal, variability of the rainfall: spatial and temporal.
- Natural vegetation-forest type and distribution, wild life conservation; biosphere reserve. (with special reference to Odisha)
- Soils- major types (ICAR's clarification) and their distribution, soil degradation and conservation.

Unit-10 : HAZARDS AND DISASTERS:CAUSES CONSEQUENCES AND MANAGEMENT 14 PERIODS

- Floods, cloudburst
- Droughts: types and impact.
- Earthquake and tsunami.
- Cyclones: features and impact
- Landslides- map work of features, based on above unit for locating labelling on the outline/political/physical map of India.
  04 PERIODS
- OTBA
  05 PERIODS

PART-C : PRACTICAL WORK 50 PERIODS

Unit-1 : FUNDAMENTALS OF MAPS 20 PERIODS

- GEO spatial data, concept of geographical matrix; point, line, area data.
- Maps- types; scales -types; construction of simple linear scale, measuring distance; finding direction and use of the symbol
- Map projection- latitude, longitude and time, typology construction and properties of projection conical with one standard parallel and Mercator's projection. (only two projection)

Unit-2 : TOPOGRAPHIC AND WEATHER MAPS 30 PERIODS

- Study of topographic map (1:50,000 to 1:25,000 survey of India map); contour cross section and identification of landforms-slopes, hill, valley, waterfall, cliffs; distribution of settlements.
- Aerial photographs: types and geometry-vertical aerial photography; difference between map and Arial photographs; photo scale determination, identification of physical and cultural features
- Satellite imageries, stages in remote sensing data acquisition, platform and sensors and data products.(photographic and digital)
- Use of weather instruments: thermometer, wet and dry -bulb thermometer, barometer, wind vane, rain gauge

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GEOGRAPHY

+2 FIRST YEAR (ARTS / SC)

Theory - One paper Time : 3 hrs
Marks : 70

PART-I	**FUNDAMENTALS OF PHYSICAL GEOGRAPHY**	**30**
UNIT-1	Geography as a decipline	25
UNIT-2	The Earth	
UNIT-3	Landforms	
UNIT-4	Climate	
UNIT-5	Water (OTBA)	

UN1T-6	Life on the Earth		
	Map Work	5	
	TOTAL	30	
PART-II	**INDIA - PHYSICAL ENVIRONMENT**		**30**
UNIT-7	Introduction	25	
UNIT-8	Physiography		
UNIT-9	Climate, Vegetation and Soil		
UNIT-10	Natural hazards and disasters		
	Map Work	5	
	TOTAL	**30**	

Note: The question paper will include a section on Open text-based assessment of 10 marks from Unitn-5 (Part-I). No other question will be asked from this unit. The open text material on this unit will be suppliedto students in advance. These materials are designed to test the analytical and higher order thinking skills of students. The OTBA will be asked in the final examination.

		10
	TOTAL	**70**

Value Based Question from any Unit:1-6 (Part-l), 7-10 (Part-ll) - 3 Marks

Note : One Value Based question can be taken from any unit 1-6 (Part-l), 7-10 (Part-ll). Accordingly the weightage of the lessons reduced as per the discretion of the teacher.

PART-III	**PRACTICAL WORK**	**30**
UNIT-1	Fundamentals of Maps	10
UNIT-2	Topographic and weather Maps	15
	Practical Record book and Viva	5

Weightage to Difficulty Level

Estimated Difficulty Level		**Percentage**
(i)	Easy(E)	20%
(ii)	Average(AV)	60%
(iii)	Difficult(D)	20%

GEOGRAPHY (THEORY)

QUESTION PAPER DESIGN
+2 FIRST YEAR (ARTS/SC)

3 HOURS **Total Marks : 70**

Sl. No.	Typology of questions	Learning Outcomes & Testin`g Skills	Short Answer (1 Mark)	Short Answer (3 Marks)	Long Answer (5 Marks)	Map Skills based (5 Marks)	Marks	%age
1.	**Remembering-** (Knowledge based simple recall questions to know specific facts, terms, concepts, principles, or theories, Identify, define or recite information), Map skill based questions (Identification, location)	• Reasoning • Analytical Skills • Critical thinking	3	1	1	1 (Identify location)	16	23%
2.	Understanding-(Comprehension- to be familiar with meaning and to understand conceptually, interpret, compare, contrast, explain, paraphrase information)		1	1	2		14	20%
3.	Application-(Use abstract information in concrete situation, to apply knowledge to new situations; Use given content to interpret a situation, provide and example, or solve a problem)			1	2		13	19%
4.	High Order Thinking Skill-(Analysis and synthesis-Classify, compare, contrast or differentiate between different pieces of information; Organise and/or integrate unique pieces of information from a variety of sources)(lncludes map interpretation)		2	1	2	1 (Map interpretation	20	28%

Sl. No.	Typology of questions	Learning Outcomes & Testing Skills	Short Answer (1 Mark)	Short Answer (3 Marks)	Long Answer (5 Marks)	Map Skills based (5 Marks)	Marks	%age
5	Evaluation and Multi-Disciplinary -(Appraise, judge, and/or justify the value or worth of a decision or outcome, or to predict outcomes based on values)		1	1+1 (Value based)			7	10%
Total			**1 × 1 = 7**	**6 × 3 = 18**	**7 × 5 =35**	**2 × 5 =10**	**70 (22) Practical 30**	**100%**
Time Estimated			**15 min.**	**60 min.**	**70 min.**	**20 min.**	**165 + 15 = 180 min**	

Note: No chapter wise weightage, care to be taken to cover chapters in books.

The question paper will include a section on **Open Text - based Assessment** of 10 marks from Unit -5 (Part I). No other question will be asked from this unit. The open text material on this unit will be supplied to students in advance These materials are designed to test the analytical and higher order thinking skills of students. The OTBA will be askec n the final examination.

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GEOGRAPHY SYLLABUS

+2 2ND YEAR (ARTS/SC)

Course Structure

Part/Unit	Topic of Chapter	Marks
A	**Fundamentals of Human Geography**	**35**
Unit-1	Human Geography	
Unit-2	People	
Unit-3	Human Activities	
Unit-4	Transport, Communication and Trade	
Unit-5	Human Settlements	
	Map Work	5
B	**India: People and Economy**	**35**
Unit-6	People	
Unit-7	Human Settlements	
Unit-8	Resources and Development	
Unit-9	Transport, Communication and International Trade	
Unit-10	Population, settlements, resources and	

	transport of Odisha	5
	Map Work	
C	**Practical Work**	**30**
Unit-1	Processing of Data and Thematic Mapping	15
Unit-2	Field study or Spatial Information Technology	10
Unit-3	Practical Record Book and Viva Voce	5

A. FUNDAMENTALS OF HUMAN GEOGRAPHY 90 Periods

Unit 1 : Human Geography: Nature and Scope 05 Periods

Unit 2 : People 18 Periods

Population-distribution, density and growth

Population change- spatial patterns and structure; determinants of population change;

Age-sex ration;rural-urban composition;

Human development- Concept, selected indicators, international comparisons

Unit 3 : Human Activities 28 Periods

Primary activities- Concept and changing trends; gathering, pastoral, mining, subsistence agriculture, modern agriculture; People engaged in agriculture and allied activities- Some examples from selected countries. Secondary activities- Concept; Manufacturing : types- household, small scale, large scale; agro based and mineral based industries; people engaged in secondary activities- some example from selected countries Tertiary activities- Concept; Trade, transport and tourism; Services; People engaged in tertiary activities- some examples from selected countries

Quaternary activities- concept; people engaged m quaternary activities- case study from selected countries

Unit 4 : Transport, Communication and Trade 23 Periods

Land Transport- Road, Railways; Trans-continental railways Water Transport- In-land waterways; major ocean routes Air Transport- Intercontinental air routes Oil and gas pipelines

Satellite communication and cyber space- importance and usage for geographical information; use of GPS International Trade- Bases and changing patterns; ports and gateways of international trade, role of WTO in international trade.

Ocean National rights and international treaties ^ \

Unit 5 : Human Settlements 10 Periods

Settlement types- rural and urban, morphology of cities(case study); distribution of mega cities, problems of human settlements in developing countries

Map Work 05 Periods

Map work on identification of features based on 1-5 Units of outline/physical/political map of World

B. INDIA; PEOPLE AND ECONOMY 90 Periods

Unit 6 : People 15 Periods

Population: Distribution, density and growth; composition of population- linguistic, religious, sex, rural-urban and occupational-regional, national causes and consequences. Migration:

International, National-causes and consequences Human Development: Selected indicators and regional patterns Population, environment and development.

Unit 7 : Human Settlements 10 Periods

Rural Settlements- types and distribution

Urban Settlements- types, distribution and functional classification

Unit 8 : Resources and Development 30 Periods

Land Resources- general land use; agriculture land use, Geographical conditions and distribution of major crops(wheat, rice, tea, coffee, cotton, jute, sugarcane, rubber), agriculture development and problems. Water Resources- availability and utilisation-irrigation, domestic, industrial and other uses; scarcity of water and conservation methods-rain water harvesting and water shade management.

Mineral and energy resources- Distribution of metallic (Iron ore, Copper, Bauxite, Manganese); Non metallic(Mica, salt), minerals; conventional (coal, petroleum, natural gas and hydroelectricity) and non-conventional energy sources (solar, wind, biogas) and conservation

Industries- Types, factor of industrial location; distribution and changing pattern of selected industries- iron and steel, cotton textile, sugar, petrochemicals, and knowledge based industries; impact of liberalisation, privatisation and planning in India- target group area planning (case study); idea **of** sustainable development (case study)

Unit 9 : Transport, communication and international trade 15 Periods

Transport and communication- roads, railways, waterways and airways: Oil and gas pipelines; geographical information and communication networks.

Unit 10 : Population, settlement, resources & transport of Odisha 15 Periods

Distribution of population

Rural and Urban settlements

Mineral Resources (Iron, Buxite, Coal) forest resources

Road and rail transport

Map Work 05 Periods

Map work on locating and levelling of features based on above units on outline map of India

C. Practical Work 40 Periods

- Unit 1: Processing of data and thematic mapping **25 Periods**
- Unit 2: Field study of Spatial Information Technology **15 Periods**
- Unit 3: Practical Record Book and Viva Voce

GEOGRAPHY

+2 SECOND YEAR (ARTS / SC)

Theory - One paper Time : 3 hrs

Marks : 70

PART-A	**FUNDAMENTALS OF HUMAN GEOGRAPHY 35 Marks**	
UNIT-1	Human Geography	
UNIT-2	People	
UNIT-3	Human Activities	30
UNIT-4	Transport, Communication and Trade	

UNIT-5	Human Settlements Map Work - World Map (for identification only relating to Unit 1 to 5)	5
	TOTAL	
PART-B	**INDIA - PEOPLE AND ECONOMY**	**35**
UNIT-6	People	
UNIT-7	Human Settlements	
UNIT-8	Resources and Development	30
UNIT-9	Transport, Communication and International Trade	
UNIT-10	Geographical Perspective on selected issues and problems	
	Map Work	5
	TOTAL	**35**
	GRAND TOTAL	**70**

Note: Value Based Question from any Unit 1-10

Weightage to Difficulty Level

Estimated Difficulty Level		**Percentage**
(i)	Easy(E)	20%
(ii)	Average(AV)	60%
(iii)	Difficult(D)	20%

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GEOGRAPHY (THEORY)

QUESTION PAPER DESIGN
+2 SECOND YEAR (ARTS/SC)

3 HOURS **Total Marks : 70**

Sl. No.	Typology of questions	Learning Outcomes & Testing Skills	Short Answer (1 Mark)	Short Answer (3 Marks)	Long Answer (5 Marks)	Map Skills based (5 Marks)	Marks	%age
1.	**Remembering-** (Knowledge based simple recall questions to know specific facts, terms, concepts, principles, or theories; Identify, define or recite information), Map skill based questions (Identification, location)	• Reasoning • Analytical Skills • Critical thinking	3	1	1	1 (Identify location)	16	23%
2.	Understanding (Comprehension- to be familiar with meaning and to understand conceptually, interpret, compare, contrast, explain, paraphrase information)		1	1	2		14	20%
3.	Application-(Use abstract information in concrete situation, to apply knowledge to new situations; Use given content to interpret a situation, provide and example, or solve a problem)			1	2		13	19%
4.	High Order Thinking Skill-(Analysis and synthesis-Classify, compare, contrast or differentiate between different pieces of information; Organise and/or integrate unique pieces of information from a variety of sources)(Includes map interpretation)		2	1	2	1 (Map interpretation	20	28%

Sl. %age	Typology of questions	Learning	Short	Short	Long	Map Skills	Marks
5	Evaluation and Multi-Disciplinary - (Appraise, judge, and/or justify the value or worth of a decision or outcome, or		1 1+1	(Value		7 10%	
	Total		**1 × 1 = 7 6 × 3 =**	**18**	**7 × 5 =35**	**2 × 5 =10**	**70 (22) Practical 30 100%**
	Time		**15 min. 60 min.**	**70 min.**		**20 min.**	**165 + 15**

Note: No chapter wise weightage, care to be taken to cover chapters in books.

Books Recommended:

Bureau's Higher Secondary (+2) Geography, Part-I & II, Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar.

SYLLABUS

MATHEMATICS (+2 2nd year)

Course Structure

Unit	Topic	Marks	No. of Periods
I	Relations and Functions & Linear Programming	20	45
II	Algebra and Probability	20	45
III	Differential Calculus	20	45
IV	Integral Calculus	20	45
V	Vector 3-D Geometry	20	45
	Total	**100**	**220**

General Imstructions :

1. All questions are compulsory in Group A, which are very short answer type questions. All questions in the group are to be answered in one word, one sentences or as per exact requirement of the question. (1x10=10 Marks)

2. Group-B contain 5(five) questions and each question have 5 bits, out of which only 3 bits are to be answered (Each bit caries 4 Marks) (4 x15=60 Marks)

3. Group-C contains 5(five) questions and each question contains 2/3 bits, out of which only 1(one) bit is to be answered. Each bit caries 6(six) Mark (6x5 =30 Marks)

UNIT - I : Relations and Functions

1. Relations and Functions

Types of relations ; reflexive, symmetric, transitive and equivalence relations. One to one and onto functions, composite functions, inverse of function. Binary operations.

2. Inverse Trigonometric Functions

Definition, range, domain, principle value branch. Graphs of inverse trigonometric functions. Elementary properties of inverse trigonometric functions.

3. Linear Programming

Introduction, related terminology such as constraints, objective function, optimization, different types of linear programming (L.P.) problems, mathematical formulation of L.P. problems, graphical method of solution for problems in two variables, feasible and infeasible regions (bounded and unbounded), feasible and infeasible solutions, optimal feasible solutions (up to three non-trivial constraints).

UNIT - II : Algebra

1. Matrices

Concept, notation, order, equality, types of matrices, zero and identity matrix, transpose of a matrix, symmetric and skew symmetric matrices. Operation on matrices; Addition and multiplication and multiplication with a scalar. Simple properties of addition, multiplication and scalar multiplication. Non commutativity of multiplication of matrices and existence of non-zero matrices whose product is the zero matrix (restrict to square matrices of order 2). concept of elementary row and column operations. Invertible matrices and proof of the uniqueness of inverse, if it exists; (Here all matrices will have real entries).

2. Determinants

Determinant of a square matrix (up to 3×3 matrices), properties of determinants, minors, co-factors and applications of determinants in finding the area of a triangle, Adjoint and inverse of a square matrix. Consistency, inconsistency and number of solutions of system of linear equations by examples, solving system of linear equations in two or three variables (having unique solution) using inverse of a matrix.

3. Probability

Conditional probability, multiplication theorem on probability. Independent events, total probability, Baye's theorem, Random variable and its probability distribution, mean and variance of random variable. Independent (Bernoulli) trials and Binomial distribution.

UNIT-III : Differential Calculus

1. Continuity and Differentiability

Continuity and differentiability, derivative of composite functions, chain rule, derivatives of inverse trigonometric functions, derivative of implicit functions. Concept of exponential and logarithmic functions.

Derivatives of logarithmic and exponential functions. Logarithmic differentiation, derivative of functions expressed in parametric forms. Second order derivatives. Rolle's and Lagrange's Mean Value Theorems (without proof) and their geometric interpretation.

2. Applications of Derivatives

Applications of derivatives : rate of change of bodies, increasing and decreasing functions, tangents and normals, use of derivatives in approximation, maxima and minima (first derivative test motivate geometrically and second derivative test given as a provable tool). Simple problems (that illustrate basic principles and understanding of the subject as well as real-life situations).

UNIT-IV Integral Calculus

1. Integrals

Integration as inverse process of differentiation. Integration of a variety of functions by substitution, by partial fractions and by parts, Evaluation of simple integrals of the following types and problems based on them.

$$\int \frac{dx}{x^2 \pm a^2}, \int \frac{dx}{x^2 \pm a^2}, \int \frac{dx}{a^2 - x^2}, \int \frac{dx}{ax^2 + bx + c}$$

$$\int \frac{dx}{ax^2 + bx + c}, \int \frac{px + q}{ax^2 + bx + c} dx,$$

$$\int \frac{px + q}{ax^2 + bx + c} dx, \int \sqrt{a^2 \pm x^2}\, dx,$$

$$\int \sqrt{x^2 - a^2}\, dx,$$

$$\int \sqrt{ax^2 + bx + c}\, dx, \int (px + q)\sqrt{ax^2 + bx + c}\, dx$$

Definite integrals as a limit of a sum, Fundamental Theorem of Calculus (without proof). Basic properties of definite integrals and evaluation of definite integrals.

2. Applications of the Integrals

Applications in finding the area under simple curves, especially lines, circles/parabolas/ ellipses (in standard form only). Area between any of the two above said curves (the region should be clearly identifiable).

3. Differential Equations.

Definition, order and degree, general and particular solutions of a differential equation. Formation of differential equation whose general solution is given. Solution of differential equations by method of separation of variables, solutions of homogeneous differential equations of first order and first degree. Solutions of linear differential equation of the type :

$\frac{dy}{dx} + py = q$, where p and q are functions of x or constants.

$\frac{dx}{dy} + px = q$, where p and q are functions of y or constants.

UNIT - V : Vectors and Three-Dimensional Geometry

1. Vectors

Vectors and scalars, magnitude and direction of a vector. Direction cosines and direction ratios of a vector. Types of vectors (equal, unit, zero, parallel and collinear vectors), position vector of a point, negative of a vector, components of a vector, addition of vectors, multiplication of a vector by a scalar, position vector of a point dividing a line segment in a given ratio. Definition, Geometrical Interpretation, properties and application of scalar (dot) product of vectors, vector (cross) product of vectors, scalar triple product of vectors, Coplanarity of three vectors.

2. Three - dimensional Geometry

Direction cosines and direction ratios of a line joining two points. Cartesian equation and vector equation of a line, coplanar and skew lines, shortest distance between two lines. Cartesian and vector equation of a plane. Angle between (i) two lines, (ii) two planes, (iii) a line and a plane. Distance of a point from a plane.

Books Recommended:

Bureau's Higher Secondary (+2) Elements of Mathematics, Part-II, Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar.

SYLLABUS

MATHEMATICS (+2 First Year)

Course Structure

Unit	Topic	Marks	No. of Periods
I	Sets and Functions	29	60
II	Algebra	37	70
III	Co-ordinate Geometry	13	40
IV	Calculus	06	30
V	Mathematical Reasoning	03	10
VI	Statistics and Probability	12	30
	Total	**100**	**240**

UNIT - I : Sets and Functions

1. Sets

Sets and their representations. Empty set, Finite and Infinite sets, Equal sets, Subsets, Subsets of a set of real numbers especially intervals (with notations), Power set, Universal set, Venn diagrams, Union and Intersection of sets, Difference of sets, Complement of a set, Properties of Complement of Sets, Practical Problems based on sets.

2. Relations & Functions

Ordered pairs, Cartesian product of sets. Number of elements in the Cartesian product of two finite sets. Cartesian product of the sets of real (upto R × R). Definition of relation, pictorial diagrams, domain, co-domain and range of a relation. Function as a special kind of relation from one set to another. Pictorial representation of a function, domain co-domain and range of a function. Real valued functions, domain and range of these functions: Constant, identity, polynomial, rational, modulus, signum, exponential, logarithmic and greatest integer function, with their graphs. Sum, difference, product and quotients of functions.

3. Trigonometric Functions

Positive and negative angles. Measuring angles in radians and in degrees and conversion of one into other. Definition of trigonometric functions with the help of unit circle. Truth of $\sin^2 x + \cos^2 x = 1$, for all x. Signs of trigonometric functions. Domain and range of trigonometric functions and their graphs. Expressing $\sin(x \pm y)$ and $\cos(x \pm y)$ in terms of $\sin x$, $\sin y$, $\cos x$ & $\cos y$ and their simple application. Deducing identities like the following :

$$\tan(x \pm y) = \frac{\tan x \pm \tan y}{1 \mp \tan x \tan y}, \quad \cot(x \pm y) = \frac{\cot x \cot y \mp 1}{\cot y \pm \cot x}$$

$$\sin x + \sin y = 2 \sin \frac{x+y}{2} \cos \frac{x-y}{2}, \quad \cos x + \cos y = 2 \cos \frac{x+y}{2} \cos \frac{x-y}{2},$$

$$\sin x - \sin y = 2 \cos \frac{x+y}{2} \sin \frac{x-y}{2}, \quad \cos x - \cos y = -2 \sin \frac{x+y}{2} \sin \frac{x-y}{2},$$

Identities related to $\sin 2x$, $\cos 2x$, $\tan 2x$, $\sin 3x$, $\cos 3x$ and $\tan 3x$. Trigonometric equations Principal solution, General solution of trigonometric equations of the type $\sin x = \sin y$, $\cos x = \cos y$ and $\tan x = \tan y$. Proof and Simple applications of sine and cosine formula.

UNIT-II : Algebra

1. Principle of Mathematical Induction

Process of the proof by induction, motivation the application of the method by looking at natural numbers as the least inductive subset of real numbers. The principle of mathematical induction and simple applications.

2. Complex Numbers and Quadratic Equations

Need for complex numbers, especially $\sqrt{-1}$, to be motivated by inability to solve some of the quardratic equations; Algebraic properties of complex numbers. Argand plane and polar representation of complex numbers. Statement of Fundamental Theorem of Algebra, solution of quadratic equations in the complex system. Square root of a complex number, cube roots of unity and its properties..

3. Linear Inequalities

Linear inequalities. Algebraic solutions of linear inequalities in one variable and their representation on the number line. Graphical solution of linear inequalities in two variables. Graphical solution of system of linear inequalities in two variables.

4. Permutations and Combinations

Fundamental principle of counting, factorial n. (n!), Permutations and combinations, derivation of formulae and their connections, simple applications.

5. Binomial Theorem

History, statement and proof of the binomial theorem for positive integral indices. Pascal's triangle, General and middle term in binomial expansion, simple applications.

6. Sequence and Series

Sequence and Series, Arithmetic Progression (A.P.). Arithmetic Mean (A.M.) Geometric Progression (G.P.), general term of a G.P, sum of n terms of a G.P., Arithmetic and Geometric series, infinite G.P. and its sum, geometric mean (G.M.), Harmonic (mean) relation between A.M., GM. and H.M., Formula for the following special sum :

Arithmetico-Geometric Series, Exponential Series, Logarithmic Series, Binomial Series.

UNIT - III : Co-ordinate Geometry

1. Straight Lines

Brief recall of two dimensional geometry from earlier classes. Slope of a line and angle between two lines. Various forms of equations of a line : parallel to axis, point-slope form, slope-intercept form, two-point form, intercept form and normal form. General equation of a line. Equation of family of lines passing through the point of intersection of two lines. Distance of a point from a line, Shifting of Origin.

2. Conic Sections

Sections of a cone : circles, ellipse, parabola, hyperbola; a point, a straight line and a pair of intersecting lines as a degenerated case of a conic section; Standard equations and simple properties of Circle, parabola, ellipse and hyperbola.

3. Introduction to Three-dimensional Geometry

Coordinate axes and coordinate planes in three dimensions. Coordinates of a point. Distance between two points and section formula.

UNIT-IV: Calculus

1. Limits and Derivatives

Derivative introduced as rate of change both as that of distance function and geometrically. Intuitive idea of limit. Limits of polynomials and rational functions, trigonometric, exponential and logarithmic functions. Definition of derivative, relate it to slope of tangent of a curve, derivative of sum, difference, product and quotient of functions. The derivative of polynomial and trigonometric functions.

UNIT-V : Mathematical Reasoning

1. Mathematical Reasoning

Mathematically acceptable statements. Connecting words/phrases-consolidating the understanding of "if and only if (necessary and sufficient) condition," "implies", "and/ or", "implied by", "and", "or", "there exists" and their use through variety of examples related to real life and Mathematics. Validating the statements involving the connecting words, difference between contradiction, converse and contrapositive,

UNIT-VI : Statistics and Probability

1. Statistics

Measures of dispersion; Range, mean deviation, variance and standard deviation of ungrouped/ grouped data. Analysis of frequency distributions with equal means but different variances.

2. Probability

Random experiments; outcomes, sample spaces (set representation). Events; occurrence of events, 'not', 'and' and 'or' events, exhaustive events, mutually exclusive events, Axiomatic (set theoretic) probability, connections with the theories of earlier classes. Probability of an event. Probability of 'not', 'and' 'or' events.

Books Recommended:

Bureau's Higher Secondary (+2) Elements of Mathematics, Part-I, Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar.

PHYSICS

(Theory)

+2 1st Year Science

(Detailed Syllabus)

No. of Periods – 160

Unit-I Physical world and Measurement (10 Periods)

Physics and its scope, Physics, Technology and Society. Measurement, need for measurement, units of measurement, fundamental and derived units, SI Units, accuracy and precision of measuring instruments, errors in measurement, absolute, relative error, percentage of error, Combination of errors, significant figures.

Dimensions of Physical quantities. Dimensional analysis and its applications.

Unit – II Kinematics. (24 Periods)

1. Motion in a straight line :

Rest and motion, Frame of reference, motion in a Straight line, position – time graph, speed and velocity. Concepts of differentiation and integration for describing motion (elementary idea), uniform and non-uniform motion, average speed and instantaneous velocity, uniformly accelerated motion, velocity – time and position – time graph, Relation for uniformly accelerated motion (graphical treatment)

2. Motion in a plane :

Scalars and vectors, general vectors and their notations, position and displacement vectors, equality of vectors, unit vectors, multiplication of vectors by a real number, addition and subtraction of vectors, relative velocity, resolution of a vector in a plane, rectangular components, Dot and Cross products of two vectors.

Motion in a plane, cases of uniform velocity and uniform acceleration – projectile motion (equation of trajectory, range, time of flight, maximum height); uniform circular motion.

Unit-III Laws of Motion (14 Periods)

Concept of force, Newton's first law, inertia, momentum and Newton's 2nd law, impulse, impulse-momentum theorem, Newton's 3rd law, Law of Conservation of linear momentum and its application. Equilibrium of Concurrent forces, static and Kinetic friction, laws of friction, rolling friction, lubrication.

Dynamics of uniform circular motion, Centripetal force, motion of a vehicle on a level circular road and vehicle on a banked road.

Unit-IV Work, Energy and Power (12 Periods)

Work done by a Constant force and variable force, kinetic energy, work- energy theorem, power. Notion of potential energy, potential energy of a spring, conservative and non-conservative forces, conservation of mechanical energy (Kinetic and Potential energies), motion in a vertical circle, elastic and in-elastic collisions in one and two dimensions.

Unit-V Motion of System of Particles and Rigid bodies : (18 Periods)

System of Particles and Rotational Motion :

Centre of mass of a two-particle system, momentum conservation and centre of mass motion, centre of mass of rigid bodies, Centre of Mass of a uniform rod.

Moment of a force, torque, angular momentum, conservation of angular momentum with its applications.

Equilibrium of rigid bodies, equations of rotational motion, comparison of linear and rotational motions.

Moment of inertia, radius of gyration, moment of inertia of simple geometrical objects (no derivation). Parallel and perpendicular axes theorem and their applications.

Unit-VI Gravitation (12 Periods)

Newton's law of gravitation, Kepler's laws of planetary motion (only statements), Gravitational field and Potential, gravitational potential energy, acceleration due to gravity and its variation with altitude and depth, Escape velocity, orbital velocity of a satellite, Geostationary satellites,

Unit-VII Properties of Bulk Matter (24 Periods)

1. Mechanical properties of Solids:

Elastic Behaviours, Stress, Strain, Hookes' Law, Stress-Strain diagram, Young's modulus, Bulk modulus, Shear modulus of rigidity, Poisson's ratio, elastic energy.

2. Mechanical properties of fluids:

Pressure due to a fluid column, Pascal's law and its applications (hydraulic lift and hydraulic brakes) effect of gravity on fluid pressure.

Surface energy and surface tension, angle of contact, excess pressure across a curved surface, application of surface tension ideas to drops, bubbles and capillary rise.

Viscosity, Stoke's law, terminal velocity, streamline and turbulent flow, critical velocity, Bernoulli's theorem and its application.

3. Thermal properties of matter:

Concepts of heat and temperature, Thermal expansion of solids, liquids and gases, anomalous expansion of water, specific heat capacity : Cp, Cv. Calorimetry, change of state, latent heat capacity .

Heat transfer: Conduction, Convection and radiation, thermal conductivity, qualitative ideas of block body radiation, wien's displacement law, Stefan's law, Greenhouse effect.

Unit-VIII Thermodynamics (12 Periods)

Thermal equilibrium, definition of temperature (Zeroth law of thermodynamics) heat, work and internal energy. First law of thermodynamics, isothermal and adiabatic processes, second law of thermodynamics, reversible and irreversible processes, Carnot's engine and refrigerator, Efficiency of Carnot's engine (no derivation).

Unit-IX Kinetic theory of gases: (08 Periods)

Equation of state of a perfect gas, work done in compressing a gas.

Kinetic theory of gases- Postulates, concept of pressure, kinetic interpretation of temperature, mean and RMS speed of gas molecules, degrees of freedom, law of equipartition of energy (statement only) and its applications to specific heat of gases, concept of mean freepath and Avogadro's number.

Unit-X Oscillation and waves (26 Periods)

1. Periodic motion: Period, Frequency, displacement as a function of time, periodic function. Simple harmonic motion and its equation, phase, oscillation of a spring, Restoring force and force constant, kinetic and potential energy in SHM, simple pendulum, derivation of expression for its time period.

Free, damped and forced oscillation (qualitative idea only), resonance.

2. Waves:

Wave motion, transverse and longitudinal waves, speed of wave motion, displacement relation for a progressive wave, speed of longitudinal wave in an elastic medium and speed of transverse wave in a stretched string (qualitative idea only), principle of superposition of waves, reflection of waves, standing waves in strings and organ pipes, fundamental mode and harmonics, Beats, Doppler's effect.

Books Recommended :

1. Bureau's Higher Secondary (+2) Physics Vol.-I published by Odissa State Bureau of Text Book Preparation and Production; Bhubaneswar.

UNIT WISE MARK DISTRIBUTION (Physics Theory)

Time- 3 hours Max. Marks.-70

Units	Subjects	Marks
Unit-I	Physical World and Measurement	23
Unit-II	Kinematics	
Unit-III	Laws of Motion	
Unit-IV	Work, Energy and Power	17
Unit-V	Motion of System of Particles and Rigid Body	
Unit-VI	Gravitation	
Unit-VII	Properties of Bulk Matter	20
Unit-VIII	Thermodynamics	
Unit-IX	Kinetic theory of gases	
Unit-X	Oscillations and Waves	10
	Total	70

QUESTION WISE BREAK UP

Type of Question	Mark per Question	Total No. of Question	Total Marks
VSA	1	14	14
SA-I	2	7	14
SA-II	3	7	21
LA	7	3	21
TOTAL			70

[VSA-Very Short Answer, SA-Short Answer, LA-Long Answer.]

1. Internal Choice : There is no overall choice in the paper. However, there is an internal choice in one question of 2 marks weightage, one question of 3 marks weightage and all the three questions of 7 marks weightage.
2. The above template is only a sample. Suitable internal variations may be made for generating similar templates keeping the overall weightage to different form of questions and typology of questions same.

PRACTICALS

Total Periods 60

Section A

Experiments

1. To measure diameter of a small spherical/cylindrical body using Vernier calipers and to measure internal diameter and depth of a given beaker/calorimeter using Vernier calipers and hence find its volume.
2. To measure diameter of a given wire and thickness of a given sheet using screw gauge.
3. To measure volume of an irregular lamina using screw gauge.
4. To determine radius of curvature of a given spherical surface by a spherometer.
5. To determine the mass of two different objects using a beam balance.
6. To find the weight of a given body using parallelogram law of vectors,
7. Using a simple pendulum, plot L-T^2 graph and hence find the effective length of a second's pendulum.
8. To study variation of time period of a simple pendulum of a given length by taking bobs of same size but different masses and interpret the result.
9. To study the relationship between force of limiting friction and normal reaction and to find the coefficient of friction between a block and a horizontal surface.
10. To find the downward force, along an inclined plane, acting on a roller due to gravitational pull of the earth and study its relationship with the angle of inclination ϕ by plotting graph between force and sin sin ϕ

Section B

Experiments

1. To determine young's modulus of elasticity of the material of a given wire.
2. To find the force constant of helical spring by plotting a graph between load and extension.
3. To study the variation in volume with pressure for a sample of air at constant temperature by plotting graphs between P and V, and between P and 1/V.
4. To determine the surface tension of water by capillary rise method.
5. To determine the coefficient of viscosity of a given viscous liquid by measuring the terminal velocity of a given spherical body.
6. To study the relationship between the temperature of a hot body and time by plotting a cooling curve.
7. To determine specific heat capacity of a given solid by method of mixtures.
8. To study the relation between frequency and length of a given wire under constant tension using sonometer.
9. To study the relation between the length of a given wire and tension for constant frequency using sonometer.

10. To find the speed of sound in air at room temperature using a resonance tube by two resonance positions.

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The record to be submitted by the students, at the time of their annual examination, has to include record of at least 15 Experiments (with a minimum of 6 each from Section – A and Section- B) performed by them. Two experiments are to be performed one from each section in the examination.

Time Allowed: -3 hours		Max. Mark: 30
Two experiments one from each section	10+10	
Practical record	4	
Viva on experiments	6	

PHYSICS

(Theory)

+2, 2nd Year Science

(Detailed Syllabus)

No. of Periods yearly – 160

Unit-I Electrostatics (22 Periods)

1. Electric charges and fields:

Electric charge and its quantization, conservation of charge, Coulomb's law, force between two point charges, force between multiple charges, superposition principle, Continuous change distribution.

Electric field due to a point charge, electric field lines, electric field due to a dipole at any point , torque on a dipole in uniform electric field.

Electric flux, Gauss's theorem (statement only) and its applications to find field due to uniformly charged infinite plane sheet, infinitely long straight wire and uniformly charged thin spherical shell (field inside and outside).

2. Electrostatic potential and capacitance:

Electric potential, potential difference, electric potential due to a point charge, potential due to a dipole, potential due to a system of charges. Equipotential surfaces, electrical potential energy of a system of two point charges and of electric dipole in an electrostatic field.

Conductors, insulators, free charges and bound charges inside a conductor, Dielectrics and electric polarization, capacitors and capacitance, capacitance of a parallel plate capacitor with

and without dielectric medium between the plates, combination of capacitors in series and in parallel energy sorted in a capacitor.

Unit- II Current Electricity: (20 Periods)

Electric current, drift velocity, mobility and their relation with electric current, Ohm's law, electrical resistance, conductance, resistivity, conductivity, effect of temperature on resistance, $V - I$ characteristics (linear and non-linear), electrical energy and power, carbon resistors, colour code of carbon resistors, combinations of resistors in series and parallel.

EMF and potential difference, internal resistance of a cell, combination of cells in series and parallel, Kirchhoff's laws and simple applications. Wheatstone bridge and meter bridge. Potentiometer-Principle and its applications to measure potential difference and for comparing EMF of two cells; measurement of internal resistance of a cell.

Unit-III Magnetic effect of Current and magnetism: (22 Periods)

1. Moving charges and magnetism:

Concept of magnetic field, Oensted's experiment, Biot-Savart law and its application to find magnetic field on the axis and at the centre of a current carrying circular loop, Ampere's law and its application to infinitely long straight wire. Straight and toroidal solenoid (qualitative treatment only); Force on a moving charge in uniform magnetic and electric fields, Cyclotron.

Force on a current carrying conductor in a uniform magnetic field, force between two parallel current carrying conductors- definition of ampere, torque experienced by a current loop in uniform magnetic field, moving coil galvanometer- its current sensitivity and conversion to ammeter and voltmeter.

2. Magnetism and matter :

Current loop as a magnetic dipole and its magnetic dipole moment, magnetic dipole moment of a revolving electron, magnetic field intensity due to a magnetic dipole (bar magnet) along its axis and perpendicular to its axis, torque on a magnetic dipole (bar magnet) in a uniform magnetic field, bar magnet as an equivalent solenoid, magnetic field lines, earth's magnetic field and magnetic elements.

Para-, dia- and ferro- magnetic substances with examples, Electromagnets and factors affecting their strengths, permanent magnets.

Unit-IV Electromagnetic induction and Alternating current: (20 Periods)

1. Electromagnetic induction :

Faraday' laws of electromagnetic induction, induced EMF and current, Lenz's law, Eddy currents, self and mutual induction.

2. Alternating Current:

Alternating currents, peak and RMS value of alternating current / voltage, reactance and impedance, LC oscillation (qualitative idea only), LCR series circuit, resonance, power in AC circuits, wattles current, A.C. generator and transformer.

Unit-V Electromagnetic waves: (04 Periods)

Basic idea of displacement current, qualitative idea about characteristics of electromagnetic waves, their transverse nature.

Electromagnetic spectrum (radio waves, microwaves, infrared, visible, Ultra violet, X-ray and gamma rays), including elementary ideas about their uses.

Unit-VI Optics (25 Periods)

1. Ray optics and optical instruments:

Reflection of light, spherical mirrors, mirror formula, lateral and longitudinal magnification, refraction of light, refractive index, its relation with velocity of light (formula only) total internal reflection and its applications, optical fibre, Refraction at spherical surfaces, thin lens formula, lens makers formula, magnification, power of lenses, combination of two thin lenses in contact, combination of a lens and a mirror, refraction and dispersion of light through prism;

Scattering of light: blue colour of sky and reddish appearance of sun at sunset and sunrise.

Optical instruments: microscopes and telescopes (reflecting and refracting) and their magnifying powers.

2. Waves Optics :

Wave front, Huygen's principle, reflection and refraction of plane wave at a plane surface using wavefronts, proof of laws of reflection and refraction using Huygen's principle. Interference, Young's double slit experiment and expression for fringe width, coherent sources, sustained interference of light, diffraction due to a single slit, width of a central maximum, resolving power of microscope and astronomical telescope (qualitative idea), polarization, plane polarized light, Brewster's law, uses of plane polarized light and polaroids.

Unit-VII Dual nature of Radiation and matter: (08 Periods)

Dual nature of radiation, Photoelectric effect, Hertz and Lenard's observations, Einstein's photoelectric equation, particle nature of light.

Matter waves- wave nature of particles, de-Broglie relation, Davisson- Germer experiment, (only conclusions should be explained).

Unit-VIII Atoms and Nuclei (14 Periods)

1. Atoms:

Alpha- particle scattering experiment, Rutherford's model of atom, its limitations, Bohr model, energy levels, hydrogen spectrum.

2. Nuclei:

Atomic nucleus, its composition, size, nuclear mass, nature of nuclear force, mass defect, binding energy per nucleon and its variation with mass number, nuclear fission, fusion, Radioactivity, alpha, beta and gamma particles/ rays and their properties, radioactive decay law, half life and decay constant.

Unit-IX Semiconductor electrocnics: (15 Periods)

Energy bands in conductors, semiconductors and insulators (qualitative idea only), p-type, n-type semiconductors, semiconductor diode, V-I characteristics in forward and reverse bias, diode as a half and full wave rectifier (centre tap), efficiency (no derivation).

Special purpose p-n junction diodes: LED, photodiode, solar cell and Zener diode and their characteristics, Zener diode as a voltage regulator.

Junction transistor, transistor action, Characteristics of transistor, transistor as an amplifier (CE configuration), basic idea of analog and digital signals, Logic gates (OR, AND, NOT, NAND, and NOR)

Unit-X Communication System: (10 Periods)

Elements of a communication system (block diagram only), bandwidth of signals (speech, TV and digital data), bandwidth of transmission medium, propagation of electromagnetic waves in the atmosphere, sky and space wave propagation, satellite communication, Need for-modulation, qualitative idea about amplitude modulation and frequency modulation, advantages of frequency modulation over amplitude modulation, basic idea about internet, mobile telephony and global positioning system (GPS).

Books Recommended:

1. Physics; Class-XII, Part-I and Part-II published by NCERT.
2. Bureau's Higher Secondary (+2) Physics Vol.-II, published by Odisha State Bureau of Text Book Preparation and Production; Bhubaneswar

UNIT WISE MARK DISTRIBUTION (Physics Theory)

Time- 3 hours Max. Marks.-70

Units	Subjects	Marks
Unit-I	Electrostatics	15
Unit-II	Current Electricity	
Unit-III	Magnetic Effects of Current and Magnetism	16
Unit-IV	Electromagnetic Induction and Alternating Currents	
Unit-V	Electromagnetic Waves	17
Unit-VI	Optics	
Unit-VII	Dual Nature of Radiation and Matter	10
Unit-VIII	Atoms and Nuclei	
Unit-IX	Semiconductor Electronics	12
Unit-X	Communication Systems	
	Total	70

QUESTION WISE BREAK UP

Type of Question	Mark per Question	Total No. of Question	Total Marks	
VSA	1	14	14	
SA-I	2	7	14	
SA-II	3	7	21	
LA	7	3	21	
TOTAL			26	70

[VSA-Very Short Answer, Sa-Short Answer, A-Long Answer.]

1. Internal Choice : There is no overall choice in the paper. However, there is an internal choice in one question of 2 marks weightage, one question of 3 marks weightage and all the three questions of 7 marks weightage.

2. The above template is only a sample. Suitable internal variations may be made for generating similar templates keeping the overall weightage to different form of questions and typology of questions same.

PRACTICALS

Total Periods 60

Section A

Experiments

1. To determine resistance per cm of a given wire by plotting a graph for potential difference versus current.
2. To find resistance of a given wire using metre bridge and hence determine the resistivity of its material.
3. To verify the laws of combination (series) of resistances using a metre bridge.
4. To verify the laws of combination (parallel) of resistances using a metre bridge.
5. To compare the EMF of two given primary cells using potentiometer.
6. To determine the internal resistance of given primary cell using potentiometer.
7. To determine resistance of a galvanometer by half-defliction method and to find its figure of merit.
8. To convert the given galvanometer (of known resistance and figure of merit) into a voltmeter of desired range and to verify the same.
9. To convert the given galvanometer (of known resistance and figure of merit) into an ammeter of desired range and to verify the same.
10. To find the frequency of the ac mains with a sonometer.

Section B

Experiments

1. To find the value of V for different values of *u* in case of a concave mirror and to find the focal length.
2. To find the focal length of a convex mirror, using a convex lens.
3. To find the focal length of a convex lens by plotting graphs between *u* and *v* or between 1/*u* and 1/*v*.
4. To find the focal length of a concave lens, using a convex lens.
5. To determine angle of minimum deviation for a given prism by plotting a graph between the angle of incidence and the angle of deviation.
6. To determine refractive index of a glass slab using a travelling microscope.
7. To find refractive index of a liquid by using convex lens and plane mirror.
8. To draw the I-V characteristic curve of a P-n junction in forward bias and reverse bias.
9. To draw the characteristic curve of a zener diode and to determine its reverse breakdown voltage.

10. To study the characteristics of a common-emitter npn or pnp transistor and to find out the values of current and voltage gains.

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The record, to be submitted by the students, at the time of their annual examination, has to include record of at least 15 Experiments (with a minimum of 6 each from Section- A and Section- B) performed by them. Two experiments are to be performed one from each section in the examination.

Time Allowed: -3 hours Max. Mark: 30

Two experiments one from each section	10+10
Practical record	4
Viva on experiments	6

STATISTICS

(FOR 2016-17 BATCH AND ONWARDS)

There shall be two Theory papers in Statistics, each of three hours duration, carrying 70 marks in first year and 70 marks in second year and two practical papers carrying 30 marks in first year and 30 marks in second year respectively, each of three hous duration.

The examination for paper- I and practical examinations will be held at the end of the first year and examination for paper-II and practical examination will be held at the end of second year respectively.

Pattern of Questions

Theory:

Group-A: Objective type questions

1. Multiple choice questions (Compulsory).
2. Very short type questions (Compulsory).

Group-B: Short answer type questions

1. 8 questions to be answered out of 12.

Group-C: Long answer type questions

1. 3 questions to be answered out of 5 questions.
2. 1 question will be set up from each unit.

Practical :

1. Solution of problems – 24 Marks
2. Record – 3 Marks
3. Viva-Voce – 3 Marks

DETAILED SYLLABUS

+2 FIRST YEAR SCIENCE

(TO BE COVERED IN FIRST YEAR CLASS)

Theory – 70 Marks

3 Hours Duration

(To COVER THE COURSE, EACH UNIT WIL TAKE AT LEAST 15 PERIODS)

Unit-I BASIC MATHEMATICS:

Fundamental Principle of Counting, Factorial n (n!). Permutation and Combination. Binomial Theorem for positive Integral indices. General and Middle terms in Binomial Expansion, Simple Applications, Logarithmic and Exponential Series.

Unit-II PROBABILITY THEORY-I:

Definition of Probability:- Classical, Empirical and Axiomatic Approach, Sample Space and events, Concepts of sets. Correspondence between sets and events. Probability by direct enumeration. Laws of addition and multiplication, Conditional Probability and independence of events. Mutual and pair-wise independence of events.

Unit-III PROBABILITY THEORY-II:

Concept of Random Variable. Discrete and Continuous random Variables and their probability distribution. Cumulative distribution function. Mathematical expectation of random variables. Addition and Multiplication laws of expectation. Variance of Sum of Random Variables.

Unit-IV STATISTICAL METHODS-I:

Definition. Scope and Limitations of Statistics. Collection of Data: Primary and Secondary Data. Classification of Data. Tabulation of Data: One-Way and Two-Way Tables. Presentation of Data: Diagrams-Simple. Multiple. Subdivided and percentage bar diagrams, pie diagrams, pictogram and Cartogram, Graphs-Frequency curve. Frequency Polygon. Ogives and Histogram.

Unit-V STATISTICAL METHODS-II:

Frequency distributions. Measures of Central Tendency: Arithmetic Mean. Geometric Mean. Harmonic Mean. Median and Mode. Quartiles. Deciles and Percentiles. Measures of Dispersion: Range. Inter-Quartile range. Quartile Deviation. Mean absolute deviation. Standard Deviation. Coefficient of Variation and Lorenz Curve. Moments: Raw and Central moments of various orders. Skewness and its different measures. Kurtosis and its measure based on moments.

PRACTICAL- 30 Marks

3 Hours Duration

The candidate is required to answer any four out of six questions to be set. Each question carries six marks. The Practical Records should be maintained in blue/black ball pen only.
Diagrammatic Representation of Data : Simple, multiple, sub-divided and percentage bar-diagrams, pie diagrams. Graphical Representation of data-Histogram. Frequency Polygon and Cumulative Frequency Curve. Arithmetic Mean. Median. Mode. G.M. and Harmonic Mean. Partition Values, Standard Deviation, mean absolute deviation. Coefficient of variation. Lorenz Curve, moments, skewness & kurtosis.

Books Recommended:

1. Bureau's Higher Secondary (+2) Statistics, Part-I, Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar.

+2 SECOND YEAR SCIENCE

(TO BE COVERED IN FIRST YEAR Class)

Theory – 70 Marks

3 Hours Duration

Unit-I STATISTICAL METHODS-II:

Curve fitting by the method of least squares: Fitting of first degree and second degree curves. Bi-variate Frequency Distribution, Simple Correlation, Computation of Correlation Coefficient and its interpretation using Probable Error. Rank Correlation (including ties). Linear Regression, Regression Coefficients and their Properties.

Unit-II PROBABILITY DISTRIBUTIONS:

Bernoulli. Binomial and Poisson Distributions with properties and applications (derivation of mean and variance only). Normal distribution, its properties and applications (mathematical proofs excluded). Concept of Testing of hypothesis, large sample tests based on normal distribution (mean. Variance and proportion)

Unit-III SAMPLING METHODS:

Finite Population Sampling : Sample. Population. Sampling units, sampling frame. Principal Steps in sample Surveys. Census versus Sample Survey. Idea about questionnaire and schedule, sampling and non-sampling errors. Idea on simple random sampling with and without replacement. Methods of Drawing Random Samples; Lottery Method and Random Number table Method. Estimation of Population mean and Variance. Stratified Sampling: Elementary Idea on stratified random sampling. Proportional and optimum allocations. Estimation of population mean and variance.

Unit-IV TIME SERIES:

Definition, uses and components of Time Series, Measurement of trend: Freehand Semi-Average. Moving Average and Least Squares Method Measurement of Seasonal Fluctuations: Simple Averages. Ratio-to-trend. Ratio-to-moving Average and Link Relatives Method.

Unit-V INDEX NUMBERS:

Need meaning and uses of Index Numbers, Important steps in the construction of index number. Problems in the selection of items. Idea of base year and Current Year. Average System of Weighing. Weighted index number: Laspeyre's, Paasche's and Fisher's ideal index numbers. Unit. Time Reversal, Factor Reversal and Circular Tests. Base shifting splicing and deflating of index, numbers. Cost of living index numbers- construction and uses.

PRACTICAL – 30 Marks

3 Hours Duration

The candidate is required to answer any four out of six questions to be set. Each question carries six marks. The Practical Records should be maintained in blue/black ball pen only.

Measurement of trend by moving averages and by Least Square (Straight line only) method. Measurement of seasonal fluctuation (sample average. Ratio to moving averages. Ratio to trend and link relative methods). Computation of index numbers by weighted average of price relatives: Laspeyre's Paasche's and Fisher's Formula: Coefficient of Correlation, Coefficient of Regression.

Books Recommended:

1. Bureau's Higher Secondary (+2) Statistics, Part-II, Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar.

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INFORMATION TECHNOLOGY

+2 1st Year SC/ARTS/COM

Unit-1

Introduction to computer system

A) Hardware concepts : [10 periods] ..... 10 marks

I) Computer organisation :

CPU, Memory (RAM & ROM & I /O), devices, communication bus, ports (serial parallel)

II) Input devices :

Keyboard, Mouse,Light pen, touch screen, graphic tablets, joystick, microphone, OCR, OMR, scanner, smart card reader, BCR, MICR, BIOMETRIC sensors, web camera.

III) Output devices :

Monitor/VDU, LED/LCD screen, television, printers (DMP, deskjet / inkjet/bubble jet printer, laser printer), plotter, speaker.

IV) Memory unit :

Memory, types of memory, RAM(SDAM, DRAM), ROM(PROM, EPROM, EEPROM),

B) Types of software :

I) System software : [10 periods] ..... 10 marks

Operating systems, need for operating system, major functions of operating system, OS for Main frame, PC/server, mobile services, language processors (assembler, interpreter & compiler)

II) Utility software :

Compression tools, disk defragmenter, anti virus.

III) Application software :

General purpose applicaton (word processor, spreadshet packages, presentation software, DBMS, IDE software), specific purpose application software (Inventory Management Software, Human Resource Management System (HRMS), Payroll systems, Financial Management System, Reservation System).

IV) Open source concepts : [7 periods] ..... 05 marks

Open source software, common foss/floss(GNU/LINUX, Firefox, Openoffice, java, NETBEANS, MYSQL), common open standards (www, html, xml, dhtml), indian language computing, character coding, unicode, different types of fonts (open type versus true type, static vs dynamic), entering language text (phonetic & key map based).

Unit - 2 :

Introduction to programming : [45 periods] ..... 25 marks

I) Getting started with programming with IDE : [20 periods] ..... 11 marks

Introduction, rapid application development with ide, basic interface components (label, text field, text area, button, checkbox, radio button) devloping general application, getting familiar with java swing user interface components (frame, dialog, option pane, panal, scroll pane, label, text field, password field, text area, button, check box, radio button, combo box, list), basic components handling methods & properties (Set text (), gettext () Is Selected (), Set Selected ())

II) Programming fundamentals : [15 periods] ..... 10 marks

Data types, concept of data types, built in data types (byte, short, int, long, float, double, char, string, boolean), variables, declaring variables, naming a variable, assigning value to variables, integer object method (parse int), double object method (parse double, parse float), control structure, decision structure (if, if.... else, switch), looping structure (while, Do-While, for)

III) Programming guidelines : [10 periods] ..... 04 marks

General concepts, Modular approach, running and debuging programs, (syntax errors, runtime error, logical errors), problem solving procedures (understanding the problem, identifying minimum number of inputs required for output, breaking down problem into simple logical steps)

Unit-3 : Relational database management system : [30 periods] ..... 20 marks

I) DBMS : [10 periods] ..... 10 marks

Introduction to data base concepts, Database, Relational database, Relation/ Table, Attribute/Field, Tuple/Row, Data types, text (char, varchar), number (decimal, int/integer), date & time. Keys (candidate key, primary key, Alternate key, Foreign key), Examples of common database management tools for mobile devices.

II) Introduction to MYSQL : [13 periods] ..... 05 marks

(ANSI SQL 99 standard commands)

Classification of SQL commands, DML (Select, Insert, Update, Delete), DDL(Create, Drop, Alter), Creating & using a database (SQL Create command to create a database, Use command to select a database), creating a Table (Create command to create a table, DESC command to display a table structure, Insert command for inserting new rows), displaying table data (select command to select all the columns, selecting specific columns using arithmetic operators, operator precedence), Defining & using column alias, eliminating deplicate values from display using Distinct keyword, Limiting rows during selection using where clause using comparison operator (=, <, >, <=, >=, <>, BETWEEN, IN, LIKE (%,-)), and using Logical operators (AND, OR, NOT & correcting logical operator precedence).

Unit -4 : IT APPLICATIONS : [7 periods] ..... 5 marks

I) E-GOVERNANCE : [4periods] ..... 3 marks

Definition, Benefit to citizens, its web sites & its social impact, e-governance challenges

II) E-learning : [3 periods]..... 2 marks

Defination, Benefit to students (learners), Benefit to teachers (Training Management), e-Learning websides & its social impact.

PRACTICAL :

I) Problem solving using Java ..... 10 marks

II) SQL Queries ..... 05 marks

III) Pratical Records ..... 10 marks

[Productivity Tools, Simple problem using Java SQL Queries, IT Application]

IV) Viva Voce ..... 05 marks

Evaluation of practical Examination :

a) **Problem / Solving** using Java :

Student is required to solve programming problems based or all concept covered in the experiment to maintain a record of these in the practical file.

b) **SQL Queries** :

Students will be asked to write 5 SQL queries in MY SQL based on one or two table during the final examination.

c) Pratical Record File :

A practical record file should include the following :

i) At least 10 solution of simple problems using IDE based java.

ii) At least 3 IT application ..... problem - solving frame work.

iii) At least 15 SQL queries on any database.

d) Viva Voce :

Swing Control Methods & Properties :

Class :	Jbutton
Swing control :	JButton
Methods :	get Text (), set Text ()
Propeties :	Background, Enabled, Font, Foreground, Text, Label
Calss :	Jlabel,jLabal
Swing control :	JLabel
Methods :	get Text (), set Text ()
Propeties :	Background, Enabled, Font, Foreground, Text
Class :	Jtext Field
Swing control :	j Text Field, j Text
Methods :	get Text (), IsEditable (), set Text ()
Propeties :	Backgroud, Editable Enabled, Font, Foreground, Text
Class :	Jradio Button
Swing control :	J Radio Button, J Radio
Methods :	get Text(), set Text(), is Selected(), set Selected ()
Propeties :	Background, Button Group, Enabled, Font, Foreground, Label, Selected, Text
Class :	Jcheck Box
Swing control :	jCheck Box
Methods :	get Text(), set Text (), is Selected(), set Selected()
Propeties :	Button Group, Font, Foreground, Label, Selected, Text
Class :	Button Group
Swing control :	jButton Group
Methods :	
Propeties :	Add
Class :	JcomboBox
Swing control :	jCombpBox
Methods :	get Selected Item (), get Selected Index (), set Model ()
Propeties :	Backgroup, Button Group, Editable, Enabled,

	Font, Foreground, Model, SelectedIndex,
	SelectedItem, Text
Class :	Jlist
Swing control :	j List
Methods :	get Selected Value ()
Propeties :	Backgroup, Buttom Group, Editable, Enabled,
	Font, Foreground, Model, Selected Index, Selected
	Item, Text
Class :	Jtable
Swing control :	jTable
Methods:	addRow(), get Model ()
Propeties :	Model
Class :	Joption Pane
Swing control :	
Methods :	showMessage Dialog ()
Propeties :	
Class :	Default Table Model
Swing control :	get Row Count (), remove Row (), add Row ()
Methods :	
Propeties :	

Commonly used Methods :

Class	**Methods**
Integer	ParseInt (), to Double(), to String()
String	Concat (), length (), substring (), to Double (),
	to Lower Case(), to Upper Case (), trim ()
Double	parseDouble(), toString(), toInt()
Math	pow(), round()

Database Connectivity Methods :

Class	**Methods**
Connection	create Statement(), close ()
Driver Manager	get Connection ()
Statement	execute Query()
Result Set	Next(), first(), last(), getString()
Exception	get Message()
System	Exit()

Information Technology

2nd Year Paper - II

UNIT-1 : Networking & Open Standards : [25 Periods] ..... [30 Marks]

i) Computer Networking : [08 Periods] ..... [10 Marks]

Networking - a brief overview, Network devices (Hub, Switch, Bridge, Router, Repeater, Gateway) & their functions, Type of Network (LAN, MAN, WAN, PAN) Network Topologies (Star, Ring, Bus, Tree), Communication, Media, Wired Technologies [Coaxial, Ethernet cable, optical fiber] Wireless Technologies [Bluetooth, Infrared, Microwave, Radio Link, Satellite link]

ii) Internet & its Application : [12 Periods] ..... [10 Marks]

Internet - an Overview, Internet Backbone, Internet Access (Dial-up, direct, Broadband connection), Role of ISP, Internet Protocols (TCP/IP, HTTP, FTP, TELNET, WAIS, GOPHER), Internet Addressing (IP Address, Domain names), MAC (Media Access Control), URL, E-mail, Address, Internet Application [www, websites & web pages, E-mail, SMS, voice mail, chatting, IRC, Video conferencing, web browsers, search Engine] wireless/mobile communication [GSM, CDMA, WLL, 3G, 4G]

iii) Network security on internet : [05 Periods] ..... [10 Marks]

Threats & prevention from virus, Use of cookies, Firewall, use of digital signature, cyber crimes [Hacking, on-line fraud, pornography, snooping, spooling, cyber stalking, software piracy] Cyber Laws.

UNIT - 2 : Programming : [Reviews of 1st yr] : [40 periods] ..... [16 Marks]

i) Programming fundamentals : [28 periods] ..... [10 Marks]

Basic concept of Access specifier for class member [data member & methods], Basic concept of inheritance, Commonly used libraries ..... staring class & methods [tasting(), concat (), length(), to lower case (), to upper case (), trim (), substring ()] & math class & methods [pow (), round ()], Accessing MY SQL database using ODBC, JDBC to connect with database.

ii) HTML based web page covering basic tag : [12 periods] ... [6 marks]

HTML, DHTML, TITLE, BODY, H1 ..... H6, Paragraph (P) Line break (BR), Section separator (HR), font, table, list (UL, OL), FORM, Creating & Accessing static & dynamic pages using HTML, DHTML & introduction to XML.

UNIT - 3 : Relational Database Management System : [30 Periods] [14 Marks]

i) Database fundamentals : [20 periods] ..... [8 Marks]

Concept of Database Transaction, committing and revoking a transaction using COMMIT & ROLLBACK, Grouping Records, GROUP BY, Group function [MAX (), MIN (), AVG(), SUM(), COUNT()] Using COUNT (*), DIDINCT clause with COUNT, group function & NULL value, displaying data from multiple tables [Cartesian product, union, concept of foreign key, equi-join].

ii) Introduction to MYSQL : [10 periods] ..... [6 Marks]

Working with NULL value, ORDER BY CLAUSE [sorting in ascending / desceding order, sorting by column alias name, sorting or multiple column], manipulating data of a table / relation [update command to change exiting data of a table, delete command for removing rows from a table], restructuring a table [ALTER TABLE for adding new columns

and deleting columns], string function [ASCII(), CHAR(), CONCAT(), INSTR(), LCASE(), UCASE (), LENGTH (), LTRIM(), MID (), RIGHT (), RTRIM (), TRIM (), SUBSTR ()], Mathematical functions [POWER (), ROUND(), TRUNCATE()], Date & time functions [CURDATE(), DATE(), MONTH(), DAYOFMONTH(), DAYOFWEEK(), DAYOFYEAR(), NOW(), SYSDATE()].

UNIT - 4 : IT Applications : [10 periods ..... [10 Marks]

i) E-business

Definition, E-commerce & its type with benefits, E-business websites & their salient features & Social impacts, E business challengers.

ii) Front-end Interface :

Introduction, Content & Features, identifying validation & display (Text Box, Radio Button, Check Box, list etc.)

iii) Front-end & Database connectivity :

Introduction, requirement & benefits

iv) Back - end database :

Introduction & its purpose, exploring the requirement of table & its essential attributes.

v) Development of database : Demonstrator & development of appropriate front - end interface & back - end interface database for e - governance applications.

PRACTICALS :

1. Problem solving using java ..... [10 Marks]
2. SQL Queries .....[05 Marks]
3. Practical records .....[05 Marks]
   - I) Simple problems using IDE Java
   - II) SQL Queries
   - III) Web-page creation by HTML
   - IV) IT Application
4. Project work ..... [05 Marks]
5. Viva Voce ..... [05 Marks]

Evaluation of practical Examination :

1. Students will be given a problem to be solved using java during final practical examination based on all concepts covered in theory.
2. SQL Queries :

Students will be asked to write 5 SQL queries in MY SQL based on one or two tables during final practical examination.

3. Practical record :

A practical record should include the following :

a) At least 12 solution of simple problem using IDE based java.

b) Solution of at least 2 simple problem incorporating java application & database connectivity.

c) At least 24 SQL queries on one & / or two tables.

d) At least two web pages creating using HTML.

4. Project file :

Students in group of 2/3 are required to work collaboratively to develop a project using programming & database skills. This project should be an application in any one of the domain..... .

a) E - governance

b) E - business

c) E - learning

With GUI front - end & corresponding database at the back - end.

5. Viva Voce

Question paper design (For Theory)

+2 1st yr (Sc/Arts/Commerce)

A. Very short Question : (1 Marks)

i) Introduction to computer systems (4 question x 1 marks) ..... 4 mark

ii) Types of software (2 question x 1 marks) ..... 2 marks

iii) Getting started with programming using IDE (1 question x 1 marks)..... 1 marks

iv) Open source concept (1 question x 1 marks) ..... 1 marks

v) Introduction to MY SQL (3 question x 1 marks) .....3 marks

vi) IT Application (1 question x 1 marks) ..... 1 marks

B. Short question : (2 mark each)

i) Introduction to computer system (1 question x 2 marks) ..... 2 marks

ii) Type of software (2 question x 2 marks) ..... 4 marks

iii) Programming using IDE (2 question x 2 marks) ..... 4 marks

iv) Introduction to MY SQL (1 question x 2 marks) ..... 2 marks

v) DBMS - (1 question x 2 marks) ..... 2 marks

vi) IT Application (2 question x 2 marks) ..... 4 marks

C. Short question : (4 marks each)

i) Introduction to computer system (1 question x 4 marks) ..... 4 marks

ii) Type of software (1 question x 4 marks) ..... 4 marks

iii) Open source concept (1 question x 4 marks) ..... 4 marks

iv) DBMS (2 question x 4 marks) ..... 8 marks

v) Programming fundamentals (1 question x 4 marks) ..... 4 marks

vi) Programming guideline (1 question x 4 marks) ..... 4 marks

D. Long question : (6 marks each)

i) Programming fundamentals (1 question x 6 marks) ..... 6 marks

ii) Getting started with programming with IDE (1 question x 6 marks) .... 6 marks

+2 2nd Yr Science/Arts/Commerce

A. Very short question : (1 marks each)

i) Computer network (2 question x 1 marks) ..... 2 marks

ii) Internet & its application (2 question x 1 marks) ..... 2 marks

iii) Network security (2 question x 1 marks) ..... 2 marks

iv) Database (2 question x 1 marks) ..... 2 marks

v) Introduction to MYSQL (2 question x 1 marks) ..... 2 marks

vi) IT Application (2 question x 1 marks) ..... 2 marks

B. Short question : (2 Marks each)

i) Computer network (2 question x 2 marks) ..... 4 marks

ii) Internet & its application (1 question x 2 marks) ..... 2 marks

iii) Network security (2 question x 2 marks) ..... 4 marks

iv) HTML base web pages (1 question x 2 marks) ..... 2 marks

v) Database (1 question x 2 marks) ..... 2 marks

vi) IT Application (2 question x 2 marks) ..... 4 marks

C. Short question : (4 Marks each)

i) Computer network (1 question x 4 marks) ..... 4 marks

ii) Network security (1 question x 4 marks) ..... 4 marks

iii) Programming Fundamental (1 question x 4 marks) ..... 4 marks

iv) HTML base web pages (1 question x 4 marks) ..... 4 marks

v) Database (1 question x 4 marks) ..... 4 marks

vi) Introduction to MY SQL (1 question x 4 marks) ..... 4 marks

vii) IT Application (1 question x 4 marks) ..... 4 marks

D. Long question : (6 marks each)

i) Internet & its application (1 question x 6 marks) ..... 6 marks

ii) Programming Fundamentals (1 question x 6 marks) ..... 6 marks

Books Recommended:

1. Bureau's Higher Secondary (+2) INFORMATION TECHNOLOGY, Part-I & II, Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar.

BIOTECHNOLOGY

Class XI

Course Structure

Units	Topics	Marks
Unit -I	Biotechnology An overview	5
Unit - II	Molecules of Life	20
Unit - III	Genes & Genomes	20
Unit - IV	Cells and Organisms	25
Practical		30

Unit-I: Biotechnology: An overview

Chapter 1: Introduction to Biotechnology

Historical Perspectives; Production Strategies in Biotechnology; Quality Control; Product Safety; Good Manufacturing Practices; Good Laboratory Practices; Intellectual Property; Public Perception; Global market; Biotechnology in India and Global Trends.

Unit-II: Molecules of Life

Chapter 1: Biomolecules: Building Blocks

Building Blocks of Carbohydrates - Sugars and Their Derivatives; Building Blocks of Proteins - Amino Acids; Building Blocks of Lipids - Simple Fatty Acids, Sphingosine, Glycerol and Cholesterol; Building Blocks' of Nucleic Acids -Nucleotides; Biochemical Transformations

Chapter 2: Macromolecules: Structure & Function

Carbohydrates - The Energy Givers; Proteins - The Performers; Enzymes - The Catalysts; Lipids and Biomembranes - The Barriers; Nucleic Acids - The Managers

Unit III: Genes & Genomes

Chapter 1: Gene Structure and Function

Cell Structure and Components; Tissues and Organs; Stem cells; Biodiversity; Organization of Life.

Chapter 2: Genomes Organization & Function

Cell Division; Cell Cycle; Cdl Communication; Movement; Nutrition; Gaseous Exchanges; Internal Transport; Maintaining the Internal Enviornment; Reproduction; In vitro Fertilization; Animal and Plant Development; Immune Response in Animals; Programmed Cell Death; Defense Mechanisms in Plants.

Unit IV: Cells and Organisms

Chapter 1: Cells: The Basic Unit of Life

Historical Perspective; Multiple Alleles; Linkage and Crossing Over; Genetic Mapping; Gene Interaction; Sex-Linked. Inheritance; Extranuclear Inheritance; Quantitative Inheritance; Genes at Population Level; Discovery of DNA as Genetic Material; Mutations; DNA Repair; Genetic Disorders

Chapter 2: Organisms: Structure & Dynamics

Genome Organization; DNA Replication; Fine Structure of Genes; From Gene to Protein; Transcription' - The Basic Process; Genetic Code; Translation; Regulation of Gene Expression

PRACTICALS

1. Preparation of buffers and pH determination
2. Sterlization techniques
3. Preparation of bacterial growth medium
4. Isolation of bacteria from curd and staining of bacteria
5. Determination of bacterial growth curve
6. Study of various stages of mitosis and calculation of mitotic index
7. Preparation of karyotyping
8. Cell counting
9. Isolation of genomic DNA

BIOTECHNOLOGY

Class XII

Unit V: Protein and Gene Manipulation (40 Marks)

Chapter-1: Recombinant DNA Technology

Introduction; Tool of rDNA Technology; Marketing Recombinant DNA; Introduction of Recomblni DNA into Host Cells; Identification of Recombinants; DNA Library; DNA Probes; Hybridiziitlj Techniques; Polymerase Chain Reaction (PCR); DNA Sequencing; Site-directed Mutagenesis

Chapter-2: Protein Structure and Engineering

Introduction to the World of Proteins; 3-D Shape of Proteins; Structure-Function Relationship Proteins Purification of Proteins; Characterization of Proteins; Protein based Products; Designlr Proteins (protein engineering)

Chapter-3: Genomics and Bioinformatics

Introduction; Genome Sequencing Projects; Gene Prediction and Counting; Genome Similarity, SNPl I and Comparative Genomics; Functional Genomics; Proteomics; History of Bioinformatics; Sequence! and Nomenclature; Information Sources; Analysis using Bioinformatics Tools

Unit VI: Cell Culture and Genetic Manipulation (30 Marks)

Chapter-1: Microbial Culture and Applications

Introduction, Microbial culture techniques, Measurement and kinetics of microbial growth, Scale up of microbial process, Isolation of microbial products, Strain isolation and improvement, Applications of microbial culture technology, Biosafety issues in microbiai technology

Chapter-2: Plant Cell Culture and Applications

Introduction; Cell and Tissue Culture Techniques; Applications of Cell and Tissue Culture; Gene Transfer Methods in Plants; Transgenic Plants with Beneficial Traits; Biosafety in Plant Genetic Engineering.

Chapter-3: Animal Cell Culture and Applications

Introduction, Animal ceil culture techniques, Characterization of cell lines, Methods of gene delivery into cells, Scale-up of animal culture process, Applications of animal cell culture, Stem cell technology, Tissue engineering

Books Recommended:

1. Bureau's Higher Secondary (+2) Biotechnology, Part-I &II, Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar.

ECONOMICS

Paper - I

Indian Economy and Statistics

A. INDIAN ECONOMY

I. Status of Indian Economy — 08 Periods, 12 Marks

* Basic characteristics of contemporary Indian economy
* Structural changes in the Indian economy and the present state of relative contributions of primary, secondary and tertiary sectors.
* Demographic features, Adverse effects of population growth and Population Policy of India

II. Sectoral Development — 10 Periods, 15 Marks

* Agriculture- Importance, low productivity and its causes, Green Revolution, present agricultural situation.
* Industry - Importance, Industrial Policies - 1948,1956,1991.
* Infrastructure -Role, Economic Infrastructure (Energy, Transport and Communications) and Social Infrastructure (Education and Health)
* Foreign Trade - Role, Composition, Direction.

III. Economic Planning and Economic Reforms — 07 Periods, 13 Marks

* Planning -Meaning,Need, Objectives and Achievements, Niti Ayog
* Economic Reforms Since 1991- need and main features of Liberalisation, Privatisation and Globalisation.

IV. Current Challenges Facing the Indian Economy — 15 Periods, 20 Marks

* Poverty - absolute and relative poverty, causes of poverty, important poverty alleviation programmes currently in place.
* Unemployment and underemployment - causes, dimensions and government programmes currently in place.
* Inflation - causes and anti-inflationary measures in place.
* Sustainable economic development - Meaning of sustainable development, Economic growth and its adverse impact on Environment, Problems of global warming and climate change.

B. STATISTICS FOR ECONOMICS

V. Introductory Statistics — 06 Periods, 07 Marks

* Meaning, scope, importance, uses and limitations of statistics in economics.
* Sources of statistical data- primary and secondary sources, NSSO and Census of India as sources of secondary data in India.
* Methods of collection of primary data - census and sampling methods and their relative merits and demerits.

VI. Frequency Distribution — 06 Periods, 08 Marks

* Meaning and types of variables and frequency distribution.
* Organisation of Data-Basics, Presentation of data - Tabular and diagrammatic presentation, Bar diagram, Pie diagram, Histogram, Frequency Polygon, Ogives, line graphs, Historigrams.

VII. Statistical Methods - I — 14 Periods, 15 Marks

* Measures of Central Tendency- Simple and Weighted
* Arithmetic Mean, Median, Mode, Concepts of Geometric Mean, Harmonic Mean
* Measures of Dispersion
  Absolute Measures - Range, Quartile Deviation, Mean Deviation and Standard Deviation
  Relative Measures - Coefficients of Range, Quartile Deviation, Mean Deviation and Standard Deviation
* Merits and Demerits of different Measures of Dispersion

VIII. Statistical Methods - II — 14Periods, 10 Marks

* Correlation- Meaning, Correlation and Causation, Types of Correlation, Scatter diagram Method of measuring correlation, uses of correlation in Economics
* Regression - Meaning, Difference between Correlation and Regression, Use§ of Regression in Economics
* Index Numbers-Meaning, Importance, Uses, Consumer and Wholesale Price Index Number.
* Time Series-Meaning, Uses and Components.

Paper- II

Elementary Micro and Macro Economics

A. INTRODUCTORY MICRO ECONOMICS

I. Introduction — 10 Periods, 10 Marks

* Definition, scope and subject matter of economics.
* Meaning of economy and central problems of an economy- scarcity and choice, what, how and for whom to produce ?
* Basic concepts - wants, utility, goods, value, price and wealth.

II. Consumption and Demand — 14 Periods, 15 Marks

* Laws of consumption - marginal and total utility, law of diminishing marginal utility, law of equimarginal utility and conditions of consumer's equilibrium .
* Demand - meaning and determinants, individual and market demand, demand schedule and demand curve, movement along and shifts in the demand curve.
* Price elasticity of demand - concept, determinants, measurement of price elasticity of demand; percentage and geometric methods (linear demand curve), relation of price elasticity of demand with total expenditure.

III. Production — 10 Periods, 10 Marks

* Meaning of production and production function - short run and long run.
* Total, Average and Marginal Product,
* Law of variable proportions and returns to a factor.

IV. Cost, Revenue and Supply — 12 Periods

15 Marks

* Cost- money and real cost, implicit and explicit cost, fixed and variable cost, Total, average and marginal costs in the short run and their relationship (simple analysis)
* Revenue- Total, average and marginal revenue and their relationship
* Supply - meaning and law of supply

V. Market — 08 Periods, 10 Marks

* Meaning and forms of market, pure and perfect competition, price determination under perfect competition and effects of shifts in demand and supply .
* Meaning and features of monopoly, monopolistic competition and oligopoly.

B. INTRODUCTORY MACRO ECONOMICS

VI. Introduction — 04 Periods, 05 Marks

* Meaning of macroeconomics, Distinction between macro- and micro-economics, subject matter of macro economics

VII. National Income — 10 Periods, 15 Marks

* Meaning and aggregates related to national income - GNP, NNP, GDP and NDP at market price and factor cost.
* National disposable income (Gross and Net), Private Income, Personal income, Personal disposable income, Nominal and real national income. Income determination - Aggregate Demand and Supply and their components, simple Keynesian Theory of Income Determination.

VIII. Money, Banking and Public Finance — 12 Periods, 20 Marks

* Meaning and Functions of Money.
* Meaning and Functions of Commercial Banks .
* Functions of Central Bank.
* Meaning of Public Finance and Difference between public and private finance.
* Budget - Meaning and objectives, balanced and unbalanced budget, surplus and deficit budget.

Books Recommended:

1. Bureau's Higher Secondary (+2) ECONOMICS, Part-I & II, Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar.

GEOLOGY

+2 1st Year Course

Theory Paper -I Full Marks - 70 marks Time- 3hours

Practical Paper -II Full Marks - 30 marks Time- 3hours

Scheme of Examination

Theory Paper

Time - 3hours
Full Marks - 70 marks

Unit - I: General Geology and Geomorphology
Unit - II: Crystallography
Unit - III: Mineralogy
Unit - IV: Palaeontology

Practical Paper

Time - 3hours
Full Marks - 30 marks

1. Crystallography
2. Mineralogy
3. Palaeontology
4. Practical Records & Viva Voce

Detailed Syllabus in GEOLOGY -

PAPER -1

Time - 3hours
20 periods

UNIT -1

A. General Geology :-

1. Subdivision and Scope of Geology
2. Origin of the Earth
3. Age of the Earth
4. Internal constitution of the earth : Crust, Mantle, Outer Core, Inner Core
5. Depth Zones of Oceans

B. Geomorphology

1. Definition of Geomorphplogy
2. Weathering and Erosion
3. Geological Work of the following Exogenetic processes with respect to Weathering, Transportation and Deposition with their important Landforms
   (a) River
   (b) Glacier
   (c) Wind
4. Definition, Classification, Causes and Effects of the following Endogenetic processes:
   (a) Earthquake
   (b) Volcanoes

UNIT - II

CRYSTALLOGRAPHY 12 periods

1. Crystalline and Amorphous substances
2. Morphology of Crystal: Face, Form, Edge, Solid Angle and Interfacial angle, Zone
3. Symmetry Elements of Crystals : - Plane of symmetry, Axis of Symmetry, Centre of Symmetry
4. Crystallographic Axes, their relationship and classification of Crystals into Six systems
5. Parameters, Indices and Symbol of Crystals
6. Description of Normal Class of different crystal systems (ExceptTriclinic) with respect to: -
   (a) Axial relationship
   (b) Symmetry Elements
   (c) Forms present (Both Tabular and description of each) and Minerals crystallised in these system (at least FIVE)

UNIT - III

MINERALOGY 15 periods

1. Definition of Minerals
2. Physical properties of Minerals :-
   Form, Colour, Lustre, Streak, Hardness, Cleavage, Fracture, Specific Gravity and any other special property.
3. Description of the following minerals with respect to their Chemical Composition, Physical properties and Uses :-
   (i) Oxides - Quartz, Corundum, Haematite, Magnetite, Chromite, Bauxite
   (ii) Carbon - Graphite
   (iii) Carbonates - Calcite, Magnesite
   (iv) Silicates - Orthoclase, Microcline, Plagioclase, Biotite, Muscovite, Olivine, Topaz, Talc, Garnet, Beryl, Hornblende, Augite, Sillimanite, Kyanite
   (v) Sulphides - Pyrite, Chalcopyrite
   (vi) Sulphates - Gypsum, Apatite
   (vii) Fluoride - Fluorite

(viii) UNIT - IV 12 periods

PALAEONTOLOGY

1. Definition, Mode of preservation and Uses of Fossils.
2. Index fossils - (with examples)
3. Morphology of Brachiopoda, Lamellibranchia, Gastropoda, Cephalopoda and Trilobites

4. Plant Fossils Glossopteris, Gangamopteris, Vertebraria, Ptilophyllurn with reference to systematic position, Morphology, Indian Occurrence and Age.

Books Recommended:

1. Bureau's Higher Secondary (+2) Geology, Part - I
Published by Odisha State Bureau of Text Book preparation and production, Bhubaneswar. ,

PAPER - 1

PRACTICAL

Full Marks - 30
Time - 3 hours

To be covered in the first year and to be conducted at the end of +2 1**st** year :

1. Crystallography: - **10 marks**

Study of Crystal models of Normal classes of Isometric, Tetragonal, Hexagonal and Orthorhombic
system with respect to Axial relationship, Symmetry elements and Forms present

2. Mineralogy:- **8 marks**

Study of physical properties of Rock forming and Ore forming Minerals listed in Theory

3. Palaeontology:- **6 marks**

Drawing, labelling, Age and description of the following Fossils :-Productus, Spirifer, Rhynchonella,
Pecten, Area, Conus, Physa, Natica, Nautilus, Ceratites, Calymene, Paradoxite, Glossopteris,
Gangamopteris, Vertebraria, Ptilophyllurn

Laboratory records and Viva Voce : **3+3 : 6 marks**

GEOLOGY

+2 2nd Year

The students reading Geology subject are required to undertake a field training programme for getting an idea about the field aspect of the subject with a minimum period of three days. The Geological Field Training will be conducted by the respective Colleges and the students will be allowed to appear the Practical examination only after the completition of the field training programme, with their own expenses.

THEORY PAPER - II

Time - 3 hours
Full Marks - 70 marks

Short questions will be set for 50 marks (fifty marks) and rest 20 (twenty marks) will be of long type. At least two long questions of 10 marks each should be set covering all units of the syllabus. There should be uniform distribution of marks for every unit for short questions also.

PRACTICAL PAPER - II

Time - 3 hours
Full Marks - 30 marks

1. Petrology
2. Structural Geology
3. Economic Geology
4. Field report
5. Viva Voce
6. Laboratory Record

The pass marks for theory paper is 30% and pass mark for practical paper is 40%. The candidate has to secure the pass marks individually in each paper to be successful in Higher Secondary Examination.

Detailed Syllabus in GEOLOGY

(+2 II Year)

THEORY PAPER

Full Marks - 70

Time - 3hours

UNIT -1 **Marks - 20** **20 periods**

PETROLOGY

A. Igneous Petrology

1. Definition and classification of Rocks.
2. Classification of Igneous rocks based on depth of Cooling.
3. Forms of Igneous Rock -
   (a) Concordant, - Sill, Laccolth, Lopolith, Phacolith
   (b) Discordant - Dyke, Batholith.
4. Texture and Structure of Igneous rocks.
5. Description of the following rocks with respect to the Textural, Structural & Mineralogical Composition.
   (a) Intrusive Rocks - Granite, Pegmatite, Syenite, Diorite, Gabbro, Dolerite, Peridotite.
   (b) Extrusive Rocks - Basalt

B. Sedimentary Petrology

1. Brief idea about mode of formation of Sedimentary Rocks.
2. Texture and Structure of Sedimentary Rocks. Description of the following Sedimentary Rocks -Conglomerate, Breccia, Sandstone, Shale, Limestone.

C. Metamorphic Petrology

1. Definition, Agents & kinds of metamorphism.
2. Metamorphic Texture and Structure.
3. Description of the following Metamorphic Rocks -Gneiss, Schist, Quartzite, Marble, Khondalite

UNIT - II **Marks-25** **25 periods**

ECONOMIC GEOLOGY and APPLIED GEOLOGY

ECONOMIC GEOLOGY:

1. Definition of Ore, gangue, Tenor and grade of Ore
2. Elementary idea about the process of formation of mineral deposits with special reference to magmatic Concentration and Hydrothermal processes.
3. (a) Mineral deposits of Odisha - An overview
   (b) Mineralogy, Mode of occurrence, Uses and Indian distribution of the following ores: (i) Iron Ore(ii) Manganese Ore (iii) Copper Ore (iv) Aluminium (v) Chromium (vi) Coal (vii) Petroleum

APPLIED GEOLOGY:

A. Groundwater

1. Definition of Ground Water
2. Hydrologic cycle
3. Advantages of using Ground Water
4. Porosity, Permeability
5. Aquifers and Water Table

B. Engineering geology

1. Engineering properties of Rocks
2. Geological consideration of the Dam site..
3. Geological consideration of the Bridge site.
4. Geological consideration of the Tunnel site.

UNIT - III Marks - 25 25 periods

STRATIGRAPHY and STRUCTURAL GEOLOGY

A. Stratigraphy

1. Stratigraphic Units and Principles of Stratigraphy
2. Standard Stratigraphic Time Scale
3. Pre Cambrian of Singhbhum and Odisha
4. Dharwar Super Group
5. Type areas of Cuddapah and Vindhyan Super Group

B. Structural Geology:

1. Attitude of Beds: Dip and Strike
2. Fold : Antiform, Synform, Anticline, Syncline, Symmetrical, Isoclinal and Recumbent Fold.
3. Fault: Normal fault, Reverse fault, Horst & Graben.
4. Unconformity and its types.

Books Recommended:

1. Bureau's Higher Secondary (+2) Geology, Part - II
Published by Odisha State Bureau of Text Book Preparation and Production, Bhubaneswar.

PRACTICAL Full-Marks - 30

Time - 3 hours

1. Petrology - 10 marks
2. Structural Geology - 6marks
3. Economic Geology (Ore Minerals) - 5 marks
4. Field Report - 3 marks
5. Viva Voce - 3 marks
6. Laboratory Records - 3 marks

Detailed Syllabus for Practical:

1. Petrology

Megascopic Identification of Rocks as mentioned in Theory.

2. Structural Geology

Study of Geological Maps and drawing of sections of Simple Maps.

3. Economic Geology

Megascopic Identification of the following Economic Minerals:- Haematite, Pyrite, Magnetite,
Pyrolusite, Psilomelane, Chalcopyrite, Bauxite, Chromite, Magnesite, Coal, Graphite.

4. Field Training:

1. Use of Clinometer Compass
2. Study of Structure and rock types, Mineral assemblages during the course of field training.
3. Preparation of Field Report and it is to be submitted at the time of Practical Examination.

5. Viva Voce

Oral questions to be answered by the students.

6. Laboratory records

The Laboratory Records are to be examined by the examiner at the time of Practical Examination

COMPUTER SCIENCE SYLLABUS
COMPUTER SCIENCE
CLASS +2 1ST YEAR (THEORY) C++

Duration: 3 hours Total Marks: 70

Unit No.	Unit Name	Marks
1.	COMPUTER FUNDAMENTALS	10
2.	PROGRAMMING METHODOLOGY	12
3.	INTRODUCTION TO C++	14
4.	PROGRAMMING IN C++	34

UNIT-1: COMPUTER FUNDAMENTALS

Classification of computers: Basics of computer and its operation; Functional Components and their interconnections, concept of Booting.

Software concepts: Types of Software - System Software, Utility Software and Application Software

System Software: Operating System, Compiler, Interpreter and Assembler;

Operating System: Need for Operating System, Functions of Operating System (Processor Management,Memory Management, File Management and Device Management), Types of Operating System-Interactive (GUI based), Time Sharing, Real Time and Distributed, Commonly used Operating System: UNIX, LINUX,Windows, Solaris, BOSS (Bharat Operating System Solutions); Mobile OS - Android, Symbian.

Utility Software: Anti Virus, File Management tools, Compression tools and Disk management tools (Disk Cleanup, Disk Defragmenter, Backup).

Open Source Concepts: Open Source Software, Freeware, Shareware, and Proprietary software

Dark Application Software: Office Tools - Word Processor, Presentation Tool, Spreadsheet Package,

Dark DatabaseManagement System: Domain Specific tools - School Management System, Inventory Management System,Payroll System, Financial Accounting, Hotel Management, Reservation System and Weather Forecasting System.

Number System: Binary, Octal, Decimal, Hexadecimal and conversion between different number systems.

I**nternal Storage encoding of Characters:** ASCII, ISCII (Indian Scripts Standard Code for Information Interchange), and UNICODE (for multilingual computing)

Microprocessor: Basic concepts, Clock speed (MHz, GHz), 16 bit, 32 bit, 64 bit, 128 bit processors;Types - CISC Processors (Complex Instruction Set Computing), RISC Processors (Reduced Instruction Set Computing), and EPIC (Explicitly Parallel Instruction Computing).

Memory Concepts: Units: Byte, Kilo Byte, Mega Byte, Giga Byte, Tera Byte, Peta Byte, Exa Byte, Zetta Byte, Yotta Byte.

Primary Memory: Cache, RAM, ROM

Secondary Memory: Fixed and Removable storage - Hard Disk Drive, CD/DVD Drive, Pen Drive, Blue Ray Disk.Input Output Ports/ Connections: Serial, Parallel and Universal Serial Bus, PS-2 port, Infrared port, Bluetooth,Firewire.

UNIT-2: PROGRAMMING METHODOLOGY (28 Theory + 10 Practical) Periods

General Concepts: Modular Approach, Clarity and Simplicity of Expressions, Use of proper names for Identifiers, Comments, Indentation; Documentation and Program Maintenance; Running and Debugging programs, Syntax Errors, Run-Time Errors, Logical Errors

Problem Solving Methodologies: Understanding of the problem, Solution for the problem, Identifying minimum number of inputs required for output, Writing code to optimizing execution time and memory storage,step by step solution for the problem, breaking down solution into simple steps (modular approach),Identification of arithmetic and logical operations required for solution; Control Structure-Conditional control and looping (finite and infinite).

Problem Solving: Introduction to Algorithms/Flowcharts.

UNIT-3: INTRODUCTION to C++ **(44** Theory + **36** Practical) Periods

Getting Started: C++ character set, C++ Tokens (Identifiers, Keywords, Constants, Operators,), Structure of a C++ Program (include files, main function), Header files - iostream.h, iomanip.h, cout, cin; use of I/O "operators (<<and>>), Use of endl and setw ( ), Cascading of I/O operators, compilation , Error Messages; Use of editor, basic commands of editor, compilation, linking and execution.

Data Types, Variables and Constants: Concept of Data types; Built-in Data types: char, int , float and double; Constants: Integer Constants, Character constants (- \n, \t, \b), Floating Point Constants, StringConstants; Access modifier: const; Variables of built-in-data types, Declaration/ Initialization of variables,Assignment statement, Type modifier: signed, unsigned, long

Operator and Expressions: Operators: Arithmetic operators (-,+,*,/,%), Assignment operator (=), **C++** shorthands (+=, -=,*=,/=,%=) Unary operators (-), Increment (++) and Decrement + (-)Operators, Relation operator (>,>=,<=,=,!=), Logical operators (!,&&,II), Conditional Operator: <condition>?<if false>; Precedence of Operators; Automatic type conversion in expressions, Type casting

UNIT 4: PROGRAMMING IN C++ **(50** Theory + **48** Practical) Periods

Flow of control

Conditional statements: if else, Nested if, switch..case..default, use of conditional operator, Nested switch..case, break statement (to be used in switch..case only); Loops: while, do - while, for andNested loops

Inbuilt Functions

Header File Categorization	**Header File**	**Function**
Standard input/output functions	stdio.h	gets ( ), puts ( )
Character Functions	ctype.h	isalnum ( ), isalpha ( ), isdigit ( ), islower ( ), isupper ( ), tolower ( ), toupper( )
String Function	string.h	strcpy ( ), strcat ( ), strlen ( ), strcmp ( ), strcmpi ( ), strev ( ), strupur ( ), strlwr ( )
Mathematical Functions	math.h	fabs ( ), pow ( ), sqrt ( ), sin ( ), cos ( ), abs ( )
Other Functions	stdlib.h	randomize ( ), random ( )

Introduction to user-defined function and its requirements.

Defining a function; function prototype, Invoking/calling a function, passing arguments to function,specifying argument data types, default argument, constant argument, call by value, call by reference,returning values from a function, calling functions with arrays, scope rules of functions and variables local and global variables.Relating to Parameters and return type concepts in built-in functions.

Structured Data Type

Arrays: Introduction to Array and its advantages.

One Dimensional Array: Declaration/initialization of One-dimensional array, Inputting array elements,accessing array elements, manipulation of array elements (sum of elements, product of elements, average of elements, linear search, finding maximum/minimum value)Declaration / Initialization of a String, string manipulations (counting vowels/ consonants/ digits/special characters, case conversion, reversing a string, reversing each word of a string)

Two-dimensional Array: Declaration/initialization of a two-dimensional array, inputting array elements,accessing array elements, manipulation of Array elements (sum of row element, column elements, diagonalelements, finding maximum / minimum values)

User-defined Data Types: Introduction to user defined data types.

Structure: Defining a Structure (Keyword Structure), declaring structure variables, accessing structure elements,passing structure to functions as value and reference, argument/parameter, function returning structure, arrayof structure, passing an array of structure as an argument/ a parameter to a function.Defining a symbol name using typedef keyword and defining a macro using #define preprocessor directive.

CLASS +2 1ST YEAR (PRACTICAL) – C++

Duration: 3 hours Total Marks: 30

1. Programming in C++ 12 Marks

One programming problem in C++ to be developed and tested on Computer during the examination. Marks are allotted on the basis of following:

Logic : 7 Marks

Documentation : 2 Marks

Output presentation : 3 Marks

2. One logical problem to be solved through flow charts. 04

3. Project Work 08

Problems using String, Number, array and structure manipulation

General Guidelines: Initial Requirement, developing an interface for user (it is advised to use text based interface screen), developing logic for playing the game and developing logic for scoring points

Memory game: A number guessing game with application of 2 dimensional arrays containing randomly generated numbers in pairs hidden inside boxes.

Hollywood/Hangman: A word Guessing game

Cows 'N Bulls: A word/number Guessing game

Random Number Guessing Game (High\Low)

A game to check whether a word does not use any of the forbidden letters

Cross„N knots game: A regular tic-tac -toe game, or

Similar projects may be or undertaken in other domains. (As mentioned in general guidelines for project,given at the end of the curriculum in a group of 2-4 students)

4. Practical File 3+1*

(a) Record of the configuration of computer system used by the student in the computer lab (by exploring inside computer system in the first 2 lab classes).

(b) Must have minimum 20 programs from the topics covered in class +2 1st yr course.
Programs on Control structures
Programs on String manipulations
Programs on array manipulations(1D & 2D)
Programs on structures.
*1 mark is for innovating while developing programmes.

6. Viva Voce **02 Marks**

Viva will be asked from the syllabus covered in class +2 1st yr and the project developed by the student(s).*1 mark is for innovating while developing programme.

CLASS +2 2NDYEAR (THEORY) - C++

Duration : 3 hours Total Marks: 70

Unit No.	Name	Marks
1.	OBJECT ORIENTED PROGRAMMING IN C++	30
2.	DATA STRUCTURE	14
3.	DATABASE MANAGEMENT SYSTEM AND SQL	8
4.	BOOLEAN ALGEBRA	8
5.	COMMUNICATION TECHNOLOGIES	10
	Total	**70**

Unit 1: Object Oriented Programming in C++ (50 Theory + 40 Practical) Periods

Object Oriented Programming: Concept of Object Oriented Programming - Data hiding, Data encapsulation,Class and Object, Abstract class and Concrete class, Polymorphism (Implementation of polymorphism using Function overloading as an example in C++); Inheritance, Advantages of Object Oriented Programming over earlier programming methodologies,

Implementation of Object Oriented Programming concepts in C++: Definition of a class, Member of aclass - Data Members and Member Functions (methods), Using Private and Public visibility modes, default visibility mode (private); Member function definition: inside class definition and outside class definition using scope resolution operator (::); Declaration of objects as instances of a class; accessing members from object (s), Objects as functionarguments-pass by value and pass by reference;

Constructor and Destructor: Constructor: special characteristics, declaration and definition of a constructor,default constructor, overloaded constructors, copy constructor, constructor with default arguments;

Destructor: Special Characteristics, declaration and definition of destructor;

Inheritance (Extending Classes): Concept of Inheritances, Base Class, Derived classes, protected visibility mode; Single level inheritance, Multilevel inheritance and Multiple inheritance, Privately derived, publicly derived and Protectedly derived class, accessibility of members from objects and within derived class (es);

Data File Handling: Need for a data file, Types of data files - Text file and Binary file;
Text File: Basic file operations on text file: Creating/Writing text into file, Reading and Manipulation of text from an already existing text File (accessing sequentially).
Binary File: Creation of file, Writing data into file, Searching for required data from file, Appending data to a file, Insertion of data in sorted file, Deletion of data from file, Modification of data in a file;Implementation of above mentioned data file handling in C++; Components of C++ to be used with file handling:
Header file: fstream.h; ifstream, ofstream, classes; Opening a text file in in, out, and app modes;Using cascading operators (»«) for writing text to the file and reading text from the file; open (), get (), read ()put (), write(), getline() and close() functions; Detecting end-of-file(with or without using eof() function),tellg(), tellp(), seekg().seekp();
Pointers:
Introduction to Pointer, Declaration and Initialization of Pointer; Dynamic memory allocation/ deallocation operators: new, delete; Pointers and Arrays: Array of Pointers, Pointer to an array (1 dimensional array),Function returning a pointer, Reference variables and use of alias; Function call by reference. Pointer to structure: De-reference/Deference operator:"*, ->; self referencial structure;
UNIT 2: DATA STRUCTURES (42 Theory + 36 Practical) Periods
Introduction to data structure- array, stack queues primitive and non-primitive data structure, linear and nonlinear structure, static and dynamic data structure.
Arrays:
One and two Dimensional arrays: Sequential allocation and address calculation;One dimensional array: Traversal, Searching (Linear, Binary Search), Insertion of an element in an array,deletion of an element from an array, Sorting (Insertion, Selection, Bubble)Two-dimensional arrays: Traversal Finding sum/difference of two NxM arrays containing numeric values, Interchanging Row and Column elements in a two dimensional array;
Stack (Array and Linked implementation of Stack):
Introduction to stack (LIFO_Last in First out Operations) Operations on stack (PUSH and POP) and its Implementation in C++, Converting expressions from INFIX to POSTFIX notation and evaluation of Postfix expression;
Queue: (Array and Linked Implementation)
Introduction to Queue (FIFO - First in First out operations)
Operations on Queue (Insert and Delete and its Implementation in C++, circular queue using array.
UNIT 3: DATABASE MANAGEMENT SYSTEMA AND SQL
Data base Concepts: Introduction to data base concepts and its need.
Relational data model: Concept of domain, tuple, relation, key, primary key, alternate key, candidate key;
Relational algebra : Selection, Projection, Union and Cartesian product;

Structured Query Language:

General Concepts: Advantages of using SQL, Data Definition Language and Data Manipulation Language;

Data Types: NUMBER/DECIMAL, CHARACTER/VARCHAR/VARCHAR2, DATE;

SQL COMMANDS: CREATE TABLE, DROP TABLE, ALTER TABLE, UPDATE ...SET.....INSERT, DELETE;

SELECT, DISTINCT, FROM, WHERE, IN, BETWEEN, GROUP BY, HAVING, ORDER BY;

SQL functions: SUM ( ), AVG ( ), COUNT ( ), MAX ( ) AND MIN ( ); Obtaining results (SELECT query) from 2 tables using equi-join, Cartesian product and Union

Note: Implementation of the above mentioned commands could be done on any SQL supported software on one or two tables.

UNIT 4: BOOLEAN ALGEBRA

Role of Logical Operations in Computing.

Binary-valued Quantities, Boolean Variable, Boolean Constant and Boolean Operators: AND, OR, NOT;

Truth Tables; Closure Property, Commutative Law, Associative Law, Identity law, Inverse Law, Principle of Duality, Idempotent Law, Distributive Law, Absorption Law, Involution Law, DeMorgan"s Law and their applications; Obtaining Sum of Product (SOP) and Product of Sum (POS) form the Truth Table, Reducing Boolean Expression (SOP and POS) to its minimal form, Use of Karnaugh Map for minimization of Boolean expressions (up to 4 variables);

Application of Boolean Logic: Digital electronic circuit design using basic Logic Gates (NOT, AND, OR,NAND, NOR)

Use of Boolean operators (NOT, AND, OR) in SQL SELECT statements Use of Boolean operators (AND,OR) in search engine queries.

UNIT 5: NETWORKING AND OPEN SOURCE SOFTWARE

Evolution of Networking: ARPANET, Internet, Interspace Different ways of sending data across the network with reference to switching techniques (Circuit and Packet switching).

Data Communication terminologies: Concept of Channel, Bandwidth (Hz, KHz, MHz) and Data transfer rate (bps, Kbps, Mbps, Gbps, Tbps).

Transmission media: Twisted pair cable, coaxial cable, optical fiber, infrared, radio link, microwave link and satellite link.

Network devices: Modem, RJ45 connector, Ethernet Card, Router, Switch, Gateway, wifi card.

Network Topologies and types: Bus, Star, Tree, PAN, LAN, WAN, MAN.

Network Protocol: TCP/IP, File Transfer Protocol (FTP), PPP, SMTP, POP3 Remote Login (Talent), and Internet Wireless/Mobile Communication protocol such as GSM, CDMA, GPRS, and WLL.

Mobile Telecommunication Technologies : 1G, 2G, 3G and 4G Electronic mail protocols such as SMTP, POP3 Protocols for Chat and Video Conferencing VOIPWireless technologies

such as Wi-Fi and WiMax

Network Security Concepts:

Threats and prevention from Viruses, Worms, Trojan horse, Spams

Use of Cookies, protection using Firewall.

India IT Act, Cyber Law, Cyber Crimes, IPR issues, hacking.

Introduction To Web services: WWW, Hyper Text Markup Language (HTML), Extensible Markup Language (XML); Hyper Text Transfer Protocol (HTTP); Domain Names; URL; Website, Web browser>. Web Servers;Web Hosting, Web Scripting - Client side (VB Script, Java Script, PHP) and Server side (ASP, JSP, PHP), web 2.0 (for social networking)

CLASS, +2 2ND YEAR (PRACTICAL) - C++

Duration: 3 hours Total Marks : 30

1. Programming in C++

One programming problem in C++ to be developed and tested in Computer during the examination Marks are allotted on the basis of following:

Logic : 7 Marks

Documentation/Indentation : 2 Marks

Output presentation : 3 Marks

Notes: The types of problem to be given will be of application type from the following topics

Arrays (One dimensional and two dimensional)

Class(es) and objects

Stack using arrays and or linked implementation

Queue using arrays (circular) and or linked implementation

Binary File operations (Creation, Displaying, Searching and modification)

Text File operations (Creation, Displaying and modification)

2. SQL Commands **05**

Five Query questions based on a particular Table / Relation to be tested practically on Computer during the examination. The command along with the result must be written in the answer sheet.

3. A digital circuit diagram (after reduction using k-map) to be given during the examination .The question must be written in the answer sheet. 02

4. Project Work 05

The project has to be developed in C++ language with Object Oriented Technology and also shouid have use of Data files. (The project is required to be developed in a group of 2-4 students)

Presentation on the computer

Project report (Listing, Sample, Outputs, Documentations)

Viva

*1 mark is for innovation while writing programme

5. Practical File 03+01*

Must have minimum 20 programs from the following topics

Arrays (One dimensional and two dimensional, sorting, searching, merging, deletion" & insertion of elements)
Class(es) and objects
Stacks using arrays and linked implementation
Queue using arrays & linked implementation (circular aslo).
File (Binary and Text) operations (Creation, Updation, Query)
Any computational Based problems
15 SQL commands along with the output based on any table/relation:

6. Viva Voce

Viva will be asked from syllabus covered in class +2 2nd year and the project developed by student.

Guidelines for Projects (Class +2 1st and 2nd year)

1. Preamble

1.1 The academic course in Computer Science includes on Project in each year. The Purpose behind this is to consolidate the concepts and practices imparted during the course and to serve as a record of competence.

1.2 A group of 2-3 students as team may be allowed to work on one project.

2. Project content

2.1 Project for class +2 1st year can be selected from the topics mentioned in the syllabus or domains on the similar lines.

2.2 Project for class +2 2nd year should ensure the coverage of following areas of curriculum:

a) Flow of control
b) Data Structure
c) Object Oriented Programming C++
d) Data File Handling

Theme of the project can be
Any subsystem of a System Software or Tool
Any Scientific or a fairly complex algorithmic situation
School Management, Banking, Library Information System, Hotel or Hospital Management System, Transport query system
Quizzes / Games;
Tutor, Computer Aided Learning Systems

2.3 It is suggested to prepare a bilingual (English and other Indian language) user manual part of project file.

2.4 The aim of the project is to highlight the abilities of algorithmic formulation, modular programming, optimized code preparation , systematic documentation and other associated aspects of software Development.

ELECTRONICS

THEORY PAPER -1(1ST YEAR)

There will be a theory paper of 70 marks and a practical paper of 30 marks after completion of one year.

Each student will be eligible to appear the practical examination only if he/she has performed at least 5(five) experiments.

Thegrading in theory will be according to the following distribution of marks.

Group -A : Very short questions including MCQ(compulsory), Short Answers

Group -B : Value based questions

Group -C : Long answer questions (3 questions to be answered out of 5,1 questions will be set up from each unit)

The grading in practical will be according to the following distribution of marks.

(a) Record - marks

(b) Viva - marks

(c) One Experiment - marks

Theory paper (1st year)

Unit -1

(a) Resistance :- Types of resistance, variable resistance, color code, power rating, specific resistance, combination of resistance, of rheostat and potentiometer, kirchoffs law and wheastone's bridge.

(b) Capacitance :- Capacitance, types of capacitors, variable capacitors, color codes, charging and discharging of capacitor, energy stored in a capacitor, DC and AC reactance (idea only) and their variation with frequency, combination of capacitors.

(c) Inductance :- Faraday's and Len's Law, self and mutual Inductance, types of inductors, inductance of a solenoid, energy stored in an inductor, DC and AC reactance (idea only) and variation with frequency, combination of Inductors.

Unit -II

(a) Circuits:- DC Circuits-RC,RL and LC circuits for growth and decay, AC Cirsuits-pure R,land C circuits and RC, RL, LC and RLC series and parallel resonance circuits Q factor.

(b) Thermo ionic Emission :- Types of electron emission, portential barrier, work function, thermo ionic emission, Richardson, Richardson-Dushman equation(NO Derivation), Chaild's law (No Derivation).

(c) Vacuum Tubes :- Diode valve working, characteristic and uses, Triode working, characteristic, constant of triode, relation between them, limitation of triode valve, use of triode as an amplifier, tetrode, characteristic, Dynatron effect and negative resistance, pentode, characteristic, function of different grids.

Unit-III

(a) Semi conductor :- Atomic structure, Explanation of conductor, semiconductor and insulator, Intrinsic and extrinsic semiconductor, P type and N type semiconductor , Energy band of extrinsic semiconductor .

(b) PN junction:- PN junction, Potential barrier, Depletion layer, forward bias and reverse bias, characteristic, Zenner diode, Characteristic of LED,LCD and Photodiode.

(c) Rectifier and filter :- Half wave, centre tapped full wave and bridge rectifier, effciency, Ripple factor, capacitor filter, imductor filter, L section filter and II section filter and RC filter(qualitative discussion of filters only). Zenner diode as voltage regulator for rectifier circuits.

Unit-IV

(a) Transistor:- PNP and NPN transistor, working, input, output and transfer characteristic of CB,CE and CC configuration, input and output impedance, current amplification factor and relation between them, leakage current, DC and AC load line, operating point, Q point.

(b) Transistor biasing :- Thermal runways, its elimination and stabilzation of operating point, transistor biasing of base resistor, feeback resistor and potential divider method.

(c) Amplifiers:- CB,CE and CC amplifiers with their voltage, current and poer gain, Phase relationship between input and output of these amplifiers. Qualitative discussion of class A, B, AB and C amplfiers with reference to load line, Q point, angle of conduction and effciency.

Unit V

(a) Instruments:- Multimeter construction and working, VTVM construction and working, Microphone-carbon and moving coil dynamic microphone, construction and working, Dynamic Loud speaker- construction and working, public Address system and its uses.

(b) Integrated circuits:- IC, basic idea, ICclassifiction, Monolithic IC, making, fabrication of components, thick and thin films (idea only), Hybrid or multichip IC (idea only).

PRACTICAL(1ST Year)

EXPERIMENTS

1. Verification of ohm's law, determination of resistance using Voltmeter and Ammeter.
2. Varification of laws of combination of resistance by meter bridge method.
3. Determination of specific resistance of resistance of resistance wire by PO Box method.
4. To draw characteristance curve of diode valve for different filament voltage. Hence determine plate resistance.
5. To draw characteristic curve of PN junction diode for forword bias only for tw0 junction diodes.
6. To draw charecteristic curve of Zenner diode for reverse bias only.

7. To calculate the value of carbon resistors from their color code for at least 10 resistors.
8. Determination of effciency and ripple factor with and without filter for half wave rectifier.
9. Recognition of electronics components like resistores, capacitors, inductors, transfromers, diodes, triode, PN junction, transistors and IC.
10. Practical of soldering:-

(a) Resistors in series, (b) Resistors in parallel

(c) Resistors-capacitors in series.

(d) Resistors-capacitors in parallel.

ELECTRONICS
THEORY PAPER (2nd YEAR)

- There will be a theory paper of 70 marks and a practical paper of 30 marks after completion of second year.
- Duration of examination of theory and practical paper will be 3 hours.
- Each student will be eligible to appear the practical examination only if he/she has performed at least 8(eight) experiments.
- The grading in theory will be according to the following distribution of marks.

Group A

1. Multiple choice/Fill in the blanks / abbreviations.
2. Answer in one sentence.
3. Short answers

Group B

4. Value based short questions

Group C

5. Long questions (3 out of 5,1 question will be set up from each unit)

The grading in practical will be according to the following distribution of marks.

a) Record -04

b) Viva -06

c) One experiment -20

THEORY

Unit -1

(a) Amplifiers:- Voltage amplifiers-RC coupled transistor amplifiers, voltage gain, frequency Response Curve, Band Width, Gain Band Width product, Advantags and use : power Amplifiers-Class B push-pull amplifiers, working principle, efficiency, output impedance, transformer coupled amplifier, gain and use.

(b) Freedback amplifiers:- Freeback technique, gain, negative feedback, voltage feedback am`plifiers, current feed back amplifiers, effect of negative feed back on input and output impedance, voltage gain, band width and frequency distortion.

(c) Oscillators:- Condition for sustained oscillation, Bark-haussen criterion, tank circuit with positive feedback, tunedcollator, Hartley oscillator, colpitt oscillator, RC phase shift oscillator, Crytal oscillator and its frequency stabillty. (Qualitative analysis of all these oscillator).

Unit-II

(a) Modulation and transmitters:- Type of modulation, amplitude modulation, side band,power dissipation in side band, modulation index and its significance, AM transmitter(explanation in block diagram), SSB transmitter (explanation in block diagram) Frequency modulation:side band

frequency, FM index, FM modulator with varactor diode detector with capacitor filter, TRF recever, AVC, super heterodyne receiver (explanation in block diagram),FM demodulation FM detection, block diagram of FM receiver and explanation of each stage, AFC fuction, use and advantage of FM in communication.

Unit-III

(a) Digital Electronics:- Decimal and binary numbes, conversion, binary arithmetic, Boolean algebra, De Morgan's theorems.

Logic gates - OR,AND, NOT,NAND,NOR,XOR, circuit symbol, use, truth table only (No electronics circuit for NAND, NOR & XOR)

(b)Antenna :- Priciple and basic idea, types of antenna, dipole antenna, directional antenna, Marconi Yagi antenna, use in transmission, T.V. receving antenna.

Unit-IV

(a) Propagation of Radio Waves:- Modes of propagation of radio waves: ground waves, sky waves, space waves, skip distance, maximum usable frequency, general idea about statellite communication, propagation, of Radio waves in lonosphere.

(b) TV :- Principle of TV transmission, scanning, TV camera, Black & white, TV transmitter and receiver (explanation in block diagram).

Unit-V

(a) Power Electronics :- Idea about JFET,SCR, DIAC, TRIAC, UJT, their working, characteristics and uses.

(b) RADAR and CRO:- Basic principle of Radar, Block diagram of Radar, its function and use Cathode Ray Oscilloscope, Basic idea and use with working.

Practical

1. Use of multimeter to measure resistance and compare them with color code. Hence, verity the law of combination of resistance. Measurement of DC and AC voltage.
2. Use of VTVM to measure resistance and compare them with color code. Hence verify combination of resistance. Measurement of DC and AC voltage.
3. To drew characteristic curve for two junction diode in forward and reverse bias condition. Heance calculate forward bias resistance.
4. To draw characteristic curve for zenner diode in reverse and forword bias condition.
5. To draw plate and mutual characterstic of triode valve and to determine the valve constants (rp,gm,u) from graph.
6. Input, output and transfer characterstic of PNP /NPN transistor in CB configuration.Hence findout (ri,ro) from graph (ri-input resistance, ro -output resistance, current amplification factor).
7. Input, output and transfer characteristic of a PNP/NPN transistor in CE configuration. Hence find out ri,ro.
8. Determine of effciency and ripple factor with and without filter for full wave and bridge rectifier.
9. To study the characteristic of FET and find its parameters from the graph.
10. To study the characteristic of SCR for different gate current and find out its parameters from graph.
11. Study of variation of Impedance of a series LCR circuit with frequency and hence find out the resonant frequency.
12. Study of variation of Impedance of a parallel LCR circuit with frequency and hence find out the resonant frequency.
13. Study of Zenner diode as a voltage stabillzer.

QUESTION WISE BREAK UP

Type of Question	Mark per Question	Total No.of Question	Total marks
VSA	1	5	05
SA-I	2	5	10
SA-II	3	12	36
VBQ	4	1	04
LA	4	3	15
	Total	26	70

[VSA-Very Short Answer, Sa-Short Answer, VBQ-Value Based Question (appraise, judge and/ or justify the value or worth of a decision or outcome or to predict out comes based on values), LA-Long Answer]

Books Recommended :

1. Bureau's Higher Secondary(+2)Electronics, Part-I & II
   Published by Odisha State Bureau of Textbook Preparation and Production, Bhubaneswar.

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