

B.COM ACCOUNTS HONS TEST SYLLABUS 2024

BASIC KNOWLEDGE OF THE FOLLOWING OF LEVEL UNDERGRADUATE (12th Standard Level)

1.ACCOUNTANCY

2.MANAGEMENT

3.ECONOMICS

4.ENGLISH GRAMMAR

5.GENERAL KNOWLEDGE

FULL MARKS: 100

MCQ: 100 QUESTIONS

DURATION: 2 HRS NEGATIVE MARKING: 3:1

St Xavier's College, Ranchi
An Autonomous College of Ranchi University
Entrance Test Syllabus 2024

Syllabus	Description
Course	B.Sc. Mathematics Honours
No. of Seats	70
Question Pattern	50 multiple choice type question to be answered by the candidate. The multiple choice questions should be answered on OMR sheet by darkening the appropriate circle with blue / black ball point pen only. 3 marks will be given for correct answer and 1 mark will be deducted for Wrong answer. Full marks- 150
Time	2 hours
Topic to be Covered	<p>All question from CBSE/ICSE/JAC +2 level.</p> <p>Set theory, Relation and function</p> <p>Algebra Linear inequality. Algebra of complex numbers, addition, multiplication, conjugation, polar representation. Quadratic equations with real coefficients, relations between roots and coefficients. Arithmetic, geometric and harmonic progressions, sums of squares and cubes of the first n natural numbers and related problems. Logarithms and their properties. Permutations and combinations, Binomial theorem for a positive integral index, properties of binomial coefficients. Matrices and Determinant</p> <p>Statistics and probability</p> <p>Trigonometry Trigonometric functions, their periodicity and graphs, addition and subtraction formulae, formulae involving multiple and sub-multiple angles, general solution of trigonometric equations. Relations between sides and angles of a triangle, sine rule, cosine rule, half-angle formula and the area of a triangle, inverse trigonometric functions.</p> <p>Analytical geometry</p> <p>Two dimensions: Straight line, Circle, Parabola, ellipse, hyperbola. Three dimensions: Direction cosines and direction ratios, equation of a straight line in space, equation of a plane, distance of a point from a plane.</p> <p>Differential calculus Limit and continuity of a function, Differentiability, Derivative of a different functions, geometrical interpretation of the derivative, tangents and normals, increasing and decreasing functions, maximum and minimum values of a function, applications of Rolle's Theorem and Lagrange's Mean Value Theorem.</p> <p>Integral calculus Integration as the inverse process of differentiation, indefinite integrals of standard functions, definite integrals and their properties.</p> <p>Application of integration Application of definite integrals to the determination of areas involving simple curves. Formation of ordinary differential equations, solution of homogeneous differential equations, variables separable method, linear first order differential equations, Concepts of Maxima and Minima.</p> <p>Vectors Addition of vectors, scalar multiplication, scalar products, dot and cross products, scalar triple products and their geometrical interpretations.</p>

R12A
29.07.2023

St Xavier's College, Ranchi
An Autonomous College of Ranchi University
Entrance Test Syllabus 2024

Syllabus	Description
Course	B.Sc. Statistics Honours
No of Seats	60
Question Pattern	50 multiple choice type question to be answered by the candidate. The multiple choice questions should be answered on OMR sheet by darkening the appropriate circle with blue / black ball point pen only. 3 marks will be given for correct answer and 1 mark will be deducted for Wrong answer. Full marks- 150
Time	2 hours
Topic to be Covered	<p>All question from CBSE/ICSE/JAC +2 level.</p> <p>Set theory, Relation and function</p> <p>Algebra Linear inequality. Algebra of complex numbers, addition, multiplication, conjugation, polar representation. Quadratic equations with real coefficients, relations between roots and coefficients. Arithmetic, geometric and harmonic progressions, sums of squares and cubes of the first n natural numbers and related problems. Logarithms and their properties. Permutations and combinations, Binomial theorem for a positive integral index, properties of binomial coefficients. Matrices and Determinant</p> <p>Statistics and probability</p> <p>Trigonometry Trigonometric functions, their periodicity and graphs, addition and subtraction formulae, formulae involving multiple and sub-multiple angles, general solution of trigonometric equations. Relations between sides and angles of a triangle, sine rule, cosine rule, half-angle formula and the area of a triangle, inverse trigonometric functions.</p> <p>Analytical geometry</p> <p>Two dimensions: Straight line, Circle, Parabola, ellipse, hyperbola. Three dimensions: Direction cosines and direction ratios, equation of a straight line in space, equation of a plane, distance of a point from a plane.</p> <p>Differential calculus Limit and continuity of a function, Differentiability, Derivative of a different functions, geometrical interpretation of the derivative, tangents and normals, increasing and decreasing functions, maximum and minimum values of a function, applications of Rolle's Theorem and Lagrange's Mean Value Theorem.</p> <p>Integral calculus Integration as the inverse process of differentiation, indefinite integrals of standard functions, definite integrals and their properties.</p> <p>Application of integration Application of definite integrals to the determination of areas involving simple curves. Formation of ordinary differential equations, solution of homogeneous differential equations, variables separable method, linear first order differential equations, Concepts of Maxima and Minima.</p> <p>Vectors Addition of vectors, scalar multiplication, scalar products, dot and cross products, scalar triple products and their geometrical interpretations.</p>

R/SB
29.07.2024

DEPARTMENT OF HISTORY

For the B.A History Honours entrance exam, 100 multiple choice questions, will have to be solved in two hours, which will be asked from the history syllabus of class 11th and 12th of Jharkhand Academic Council.

Sanjay Kumar Sinha
27/2/24 —
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DEPARTMENT OF ENGLISH

St. Xavier's College (Autonomous), Ranchi

Entrance Test Syllabus for English Honours under NEP, 2024.

Students will be tested on their language skills – grammar, vocabulary, and writing skills, reading comprehension; and their general awareness of English literature.

The test will be of two hours and will carry 100 marks.

There will be two sections. **Section - A** will contain multiple choice questions. **Section - B** will contain one question for descriptive answer. **Both sections are compulsory**. Section A will be of 70 marks and Section B will be of 30 marks.

Note: Negative marking 2:1

For every two wrong answers, 1 mark will be deducted.

Every correct answer will carry 2 marks.

Julia J. Hsu
27.7.2024



St. Xavier's College, Ranchi
An Autonomous College of Ranchi University Entrance
test syllabus 2024

Syllabus	Description
Course	B.A. Economics
Eligibility	Eligibility for admission in B.A. Economics Hons. is: 50 % marks in aggregate in Science/Arts/Commerce at +2 Level. Student from all the three Streams can apply.
Question Pattern	<ul style="list-style-type: none">• Full Marks = 100• Number of Objective Questions = 80 (1 marks each; No Negative Marks)• Number of Descriptive Questions = 2 (10 marks each)
Time	2 Hours

Bark 25.7.2024

HOD

Department of Economics
St. Xavier's College
RANCHI-834001

Syllabus for B.A. Economics entrance exam includes Economics of Class XIth & XIIth level which includes papers such as :-

1. Introduction to Microeconomics

- a. What is Microeconomics?
- b. Central problems
- c. Consumer Behaviour and Demand
 - i. Consumer's Equilibrium: meaning and attainment of equilibrium through Utility Approach: One and two commodity cases. ii. Demand: market demand, determinants of demand, demand schedule, demand curve, movement along and shifts in the demand curve, price elasticity of demand, measurement of price elasticity of demand – percentage, total expenditure, and geometric methods

2. Introductory Macroeconomics

- a. Macroeconomics: meaning.
- b. Circular flow of income, concepts of GDP, GNP, NDP, NNP (at market price and factor cost).
- c. Measurement of National Income –Value Added method, Income method, and Expenditure method.
- d. Determination of Income and Employment
 - i. Aggregate demand, aggregate supply, and their components
 - ii. Meaning of involuntary unemployment and full employment
 - iii. Determination of income and employment: two-sector model
 - iv. Concept of investment multiplier and its working
 - v. Problems of excess and deficient demand
 - vi. Measures to correct excess and deficient demand – availability of credit, change in government spending
 - vii. Money and Banking

3. Government Budget and Economy

- a. Government budget – meaning and its components
- b. Objectives of government budget
- c. Classification of receipts – revenue and capital; classification of expenditure – revenue and capital, plan and non-plan, and developmental and non-developmental
- d. Balanced budget, surplus budget, and deficit budget: meaning and implications
- e. Revenue deficit, fiscal deficit, and primary deficit: meaning and implications; measures to contain different deficits.

4. Balance of Payments

- a. Balance of payments accounts – definition & components

5. Indian Economy

6. Basic Statistics (Class 11th level)

7. Basic Quantitative Aptitude



DEPARTMENT OF GEOGRAPHY

ST. XAVIER'S COLLEGE, RANCHI
(An Autonomous College of Ranchi University)

ADMISSION-2024 ENTRANCE TEST SYLLABUS

SYLLABUS	DESCRIPTION
COURSE	B.A GEOGRAPHY (H)
NO OF SEAT	70 DAY + 70 EVE
QUESTION PATTERN	MULTIPLE CHOICE QUESTIONS – 60 MARKS (Candidates are required to select the correct answer and darken the bubble in the OMR SHEET) & ESSAY- 40 MARKS. (One essay within 500 words & use maps/diagrams)
TIME	2 HOURS
TOPIC TO BE COVERED	BASIC KNOWLEDGE ON THE TOPICS STUDIED AT + 2 LEVEL COVERING THE FOLLOWING – PHYSICAL GEOGRAPHY CLIMATOLOGY OCEANOGRAPHY INDIAN GEOGRAPHY REGIONAL GEOGRAPHY- WORLD, INDIA, JHARKHAND GEOGRAPHICAL THOUGHT CARTOGRAPHY MAP WORK – INDIA AND WORLD STATISTICS (UP TO +2 LEVEL) BASICS OF COMPUTER, GIS & GPS.
ENTRANCE DATE & TIME	WWW.SXCRAN.ORG
LAST DATE	WWW.SXCRAN.ORG/
VENUE	ST. XAVIER'S COLLEGE, RANCHI
REMARKS	FOR DETAILS (DATE & TIME OF ENTRANCE TEST, MERIT LIST, WAITING LIST ETC.) VISIT: WWW.SXCRAN.ORG

Admission. 2024

Department of Hindi
ST. Xavier's College, Ranchi.
An Autonomous College of Ranchi University
Entrance Test Syllabus

Time : 2 Hours
Syllabus : Description
Course : B.A. Hindi (Hons.)
No. of Seats : Day - 60 + Evening 60

प्रश्न-प्राश्य : वैकल्पिक विषयनिष्क प्रश्न - 100 अंक

- निबंध — 30 अंक — $30 \times 1 = 30$
- पल्लवन — 20 अंक — $20 \times 1 = 20$
- हिन्दी साहित्य - 20 अंक — $20 \times 1 = 20$
- व्याकरण — 30 अंक — $15 \times 2 = 30$

निबंध : सामाजिक, आर्थिक, राजनीतिक, वैज्ञानिक एवं खेल से संबंधित विषयों पर।

पल्लवन : गद्य के अर्थ एवं समग्र दिष्टी शब्द संख्या : 200 शब्द
पंक्ति/कथन का विश्लेषण /
अपठित गद्यांश/काव्यांश का विवेचन।

हिन्दी साहित्य :

शब्द संख्या : 200

कबीरदास, सूरदास, तुलसीदास, रहीम, रसखान,
भारतेंद्र हरिश्चन्द्र, प्रेमचंद एवं रामधारी सिंह दिनकर
का साहित्यिक परिचय।

व्याकरण :

शब्द संख्या : 200

संज्ञा, सर्वनाम, क्रिया, विशेषण, संधि, समास, काक,
विभक्ति, उपसर्ग, उल्लेख, वाक्य-संश्लेषण।

योग्यता : कम-से-कम 50 प्रतिशत अंकों के साथ इंटरमीडिएट की परीक्षा
कला/विज्ञान/कृषि में उत्तीर्ण,
हिन्दी विषय में कम-से-कम 50 प्रतिशत अंक (अनिवार्य है)।

Entrance Test : Date & Time

Last Date —

www.sxcraan.org

Venue —

ST. Xavier's College, Ranchi.

Remarks —

Visit : www.sxcraan.org.

DEPARTMENT OF SOCIOLOGY
ST. XAVIER'S COLLEGE, RANCHI

General Instructions:

- I. There will be one Question Paper which will have 50 questions.
- II. The Question Paper will have two Parts i.e. Part A and Part B
- III. Part A will have 45 questions based on Subject-Specific Knowledge.
- IV. Part B will have 05 essay-based questions from contemporary issues out of which any two are to be attempted.

Syllabus for PART A (Subject-Specific Knowledge)

Basic Concepts in Sociology:

- Sociology: Definition, nature and scope; Relationship with other Social Sciences: Psychology, Anthropology, History, Economics and Political Science.
- Basic Concepts: Social Structure, Society, Social Organization, Community, Association, Norms, Values.
- Status and Role: Types of status and role and their interrelationship
- Socialization: Meaning, types, processes and agencies.
- Culture: Meaning, characteristics: material and non-material culture.

Social Processes and Problems:

- Social Processes: Cooperation, Accommodation, Assimilation, Competition and Conflict.
- Social Groups: Definition, characteristics, types (primary and secondary; in-group and out-group; Reference group and Peer group).

- Social Institutions: Marriage; Family; Kinship Education, Religion and Economy: Meaning and Functions
- Social Control: Meaning, Significance and agencies.

Society, Culture and Social Change:

- Societies: Types and Characteristics- Tribal, Rural, Urban, Industrial and Post-Industrial.
- Culture: Definition and Nature; Types- Material and Non- Material.
- Socialization: Importance, Process and Stages.
- Social Control: Types and Means
- Processes of Social Change: Characteristic Features of Industrialization, Modernization, Globalization and Secularization
- Social Stratification: Types, theories of stratification social mobility and its types

Indian Society:

- Evolution of Indian Society: Traditional basis of Indian Society; Unity and Diversity in India; India as a Pluralistic Society.
- Caste, its Changing Dimensions in India: Dominant caste.
- Processes of Social Change in India: Sanskritization, Westernization, Modernization.
- Social Issues and Problems: Gender Discrimination, Problems of Women; Problems of Dalits, OBCs and Minorities.

Social Problems in India:

- Social Problem: Meaning and Definition; Importance of the Study of Social Problems.
- Structural Issues: Inequality of Caste, Class, Gender and Ethnicity

- Problems and Issues: Female Foeticide, Dowry, Domestic Violence, Divorce; Problems of Aged.
- Social Disorganization: Crime, Juvenile Delinquency, Corruption, Communalism, Drug Addiction, Suicide, Nepotism, Trafficking of women and children and AIDS

Varadachari
26/07/24

ST. XAVIER'S COLLEGE, RANCHI
DEPARTMENT OF BOTANY
ENTRANCE TEST FOR UG BOTANY
SESSION- 2024-28

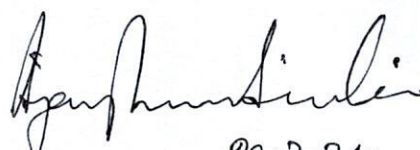
TIME: 2 hours

FULL MARKS: 100 (50 MCQs+ 50 SUBJECTIVE), NO NEGATIVE MARKING

TOTAL NO. OF QUESTIONS: 50 MCQs (1 mark each) + 5 SUBJECTIVE (10 marks each)

SYLLABUS:

- 1) The Living World
- 2) Biological Classification
- 3) Plant Kingdom
- 4) Morphology and Anatomy of Flowering Plants
- 5) Cell- Structure, Division and Function
- 6) Plant Physiology
- 7) Sexual Reproduction in Flowering Plants
- 8) Genetics and Evolution
- 9) Microbes in Human Welfare
- 10) Biotechnology- Principles, Processes and Applications
- 11) Ecology and Environment


29.7.24,

Head
Department of Botany
St. Xavier's College
Ranchi

SYLLABUS FOR FYUGP-NEP ZOOLOGY ENTRANCE EXAMINATION

The syllabus for FUYGP-NEP **ZOOLOGY** entrance examination will be based on NCERT CBSE class XI and class XII syllabus 2022 – 2024.

Questions will be MCQs/assertion and reasoning/diagram based.

Bharti Singh Raipat
24/07/24

(Dr. Bharti Singh Raipat)
Associate Professor & Head
Department of Zoology,
St. Xavier's College, Ranchi

Entrance Exam 2024

Department of Geology

St. Xavier's College (Autonomous), Ranchi

The geology entrance test will comprise two groups

1. Multiple Choice Questions (100 MCQs with negative marking)
2. Short answer- Descriptive type questions.

Syllabus for Multiple Choice Questions

1. Earth and planetary system - Evolution, planets and their characteristics.
2. Mineralogy & Petrology- minerals and their importance, rock types, and their formation process.
3. Knowledge of various branches of geology, and geological time scale.
4. Basics of physical geology- geomorphic process and agents, landforms formed by various agents.
5. Global tectonics- plate motions and boundaries.
6. Applied geology- Natural hazards and mitigation, environmental and groundwater geology.
7. Resources Geology - ore minerals, fossil fuels, their composition, occurrence, and distribution with special reference to the Jharkhand.
8. General knowledge about geological features, and engineering structures such as Dam, Bridge, Tunnel, etc.

Syllabus for Short answer- descriptive type questions.

1. Natural Hazards and Disaster Management.
2. Mineral Resources of Jharkhand- occurrence and distribution.
3. Geology: Scope and applications.
4. Environmental pollution: Causes and effects

Chemistry Syllabus

For Entrance Test 2024

1. Organic Chemistry – Some Basic Principles
General introduction, methods of purification, qualitative and quantitative analysis, classification and IUPAC nomenclature of organic compounds. Electronic displacements in a covalent bond: inductive effect, electrometric effect, resonance and hyper conjugation. Homolytic and heterolytic fission of a covalent bond: free radicals, carbocations, carbanions; electrophiles and nucleophiles, types of organic reactions
2. Classification of Hydrocarbons. Aliphatic Hydrocarbons: Alkanes – Nomenclature, isomerism, conformations (ethane only), physical properties, 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 (Markovnikov'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 mono-substituted benzene; carcinogenicity and toxicity
3. 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 for monosubstituted compounds only). Uses and environmental effects of – dichloromethane, trichloromethane, tetrachloromethane, iodoform, freons, DDT
4. 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, electrophilic substitution reactions, uses of phenols. Ethers : Nomenclature, methods of preparation, physical and chemical properties, uses
5. Aldehydes and Ketones: Nomenclature, nature of carbonyl group, methods of preparation, physical and chemical properties, and mechanism of nucleophilic addition, reactivity of alpha

Dr. U R Sen
26/07/2024
Chem Deptt (SXC)

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

6. Amines: Nomenclature, classification, structure, methods of preparation, physical and chemical properties, uses, identification of primary secondary and tertiary amines
7. Coordination compounds : Introduction, ligands, coordination number, colour, magnetic properties and shapes, IUPAC nomenclature of mononuclear coordination compounds, bonding, Werner's theory VBT,CFT; isomerism (structural and stereo)
8. General introduction ,electronic configuration, occurrence and characteristics of transition metals, general trends in properties of the first row transition metals – metallic character, ionization enthalpy, oxidation states, ionic radii, colour, catalytic property, magnetic properties Lanthanoids – electronic configuration, oxidation states, chemical reactivity and lanthanoid contraction and its consequences.
9. Group 15 elements: General introduction, electronic configuration, occurrence, oxidation states, trends in physical and chemical properties; nitrogen – preparation, properties and uses; compounds of nitrogen: preparation and properties of ammonia and nitric acid, oxides of nitrogen (structure only); Phosphorous-allotropic forms; compounds of phosphorous: 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 – 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 (structures only).
10. Chemical Kinetics: Rate of a reaction (average and instantaneous), factors affecting rates 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). Activation energy, Arrhenius equation.
11. Electrochemistry
Redox reactions; conductance in electrolytic solutions, specific and molar conductivity variations 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

12. 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 B.P., depression of freezing point, osmotic pressure, determination of molecular masses using colligative properties, abnormal molecular mass, Vant Hoff factor

13.1 Equilibrium

Equilibrium in physical and chemical processes, dynamic nature of equilibrium, law of mass action, equilibrium constant, factors affecting equilibrium – Le Chatelier's principle; ionic equilibrium – ionization of acids and bases, strong and weak electrolytes, degree of ionization, ionization of polybasic acids, acid strength, concept of pH., Hydrolysis of salts (elementary idea), buffer solutions, Henderson equation, solubility product, common ion effect (with illustrative examples)

14. Redox Reactions

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

15. Thermodynamics

Concepts of system, types of systems, 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. Introduction of entropy as a state function, Second law of thermodynamics,

16. 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 simple molecules, molecular orbital theory of homonuclear diatomic molecules (qualitative idea only). Hydrogen bond

17. Classification of Elements and Periodicity in Properties

periodic trends in properties of elements –atomic radii, ionic radii, inert gas radii, ionization enthalpy, electron gain enthalpy, electronegativity, valence

18. Structure of Atom

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 exclusion principle and Hund's rule, electronic configuration of atoms, stability of half filled and completely filled orbitals.

19. Some Basic Concepts of Chemistry

Mole concept and molar mass; percentage composition and empirical and molecular formula; chemical reactions, stoichiometry and calculations based on stoichiometry

St. Xavier's College Ranchi

Syllabus for Entrance in Physics Hons.

Physical World and Measurement

Need for measurement: Units of measurement; systems of units; SI units, fundamental and derived units. Length, mass and time measurements; accuracy and precision of measuring instruments; errors in measurement; significant figures. Dimensions of physical quantities, dimensional analysis and its applications.

Scalar and vector quantities

Position and displacement vectors, general vectors and notation, equality of vectors, multiplication of vectors by a real number; addition and subtraction of vectors. Unit vectors. Resolution of a vector in a plane – rectangular components, Scalar and Vector products of Vectors.

Kinematics

Frame of reference, Motion in a straight line: Position-time graph, speed and velocity. Uniform and non-uniform motion, average speed and instantaneous velocity. Uniformly accelerated motion, velocity-time, relations for uniformly accelerated motion. Relative velocity, Motion in a plane. Cases of uniform velocity and uniform acceleration – projectile motion.

Laws of Motion

Inertia, Newton's first law of motion; momentum and Newton's second law of motion; impulse; Newton's third law of motion. Law of conservation of linear momentum and its applications. Equilibrium of concurrent forces. Static and kinetic friction, laws of friction, rolling friction, lubrication. Dynamics of uniform circular motion: Centripetal force, examples of circular motion (vehicle on level circular road, vehicle on banked road).

Work, Energy and Power

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

Motion of System of Particles and Rigid Body

Centre of mass of a two-particle system, momentum conservation and centre of mass motion. Centre of mass of a rigid body; centre of mass of uniform rod. Moment of a force, torque, angular momentum, conservation of angular momentum with some examples. Equilibrium of rigid bodies, rigid body rotation and equation of rotational motion, comparison of linear and rotational motions; moment of inertia, radius of gyration. Values of M.I. for simple geometrical objects. Statement of parallel and perpendicular axes theorems and their applications.

Gravitation

Kepler's laws of planetary motion. The universal law of gravitation. Acceleration due to gravity and its variation with altitude and depth. Gravitational potential energy; gravitational potential. Escape velocity, orbital velocity of a satellite. Geostationary satellites.

Properties of Bulk Matter

Elastic behaviour, Stress-strain relationship, Hooke's law, Young's modulus, bulk modulus, shear, modulus of rigidity, Poisson's ratio; elastic energy. Pressure due to a fluid column; Pascal's law and its applications (hydraulic lift and hydraulic brakes). Effect of gravity on fluid pressure. Viscosity, Stokes' law, terminal velocity, Reynold's number, streamline and turbulent flow. Critical velocity, Bernoulli's theorem and its applications. Surface energy and surface tension, angle of contact, excess pressure, application of surface tension ideas to drops, bubbles and capillary rise.

Heat and Temperature

Heat, temperature, thermal expansion; thermal expansion of solids, liquids, and gases. Anomalous expansion. Specific heat capacity: C_p , C_v – calorimetry; change of state – latent heat. Heat transfer – conduction and thermal conductivity, convection and radiation. Qualitative ideas of Black Body Radiation, Wein's displacement law, Newton's law of cooling and Stefan's law.

Thermodynamics

Thermal equilibrium and 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. Heat engines.

Behaviour of Perfect Gas and Kinetic Theory

Equation of state of a perfect gas, work done on compressing a gas. Kinetic theory of gases: Assumptions, concept of pressure. Kinetic energy and temperature; rms speed of gas molecules; degrees of freedom, law of equipartition of energy (statement only) and application to specific heat capacities of gases; concept of mean free path, Avogadro's number.

Oscillations and Waves

Periodic motion – period, frequency, displacement as a function of time. Periodic functions. Simple harmonic motion (SHM) and its equation; phase; oscillations of a spring – restoring force and force constant; energy in SHM – kinetic and potential energies; simple pendulum – derivation of expression for its time period; free, forced and damped oscillations (qualitative ideas only), resonance. Wave motion. Longitudinal and transverse waves, speed of wave motion. Displacement relation for a progressive wave. Principle of superposition of waves, reflection of waves, standing waves in strings and organ pipes, fundamental mode and harmonics. Beats. Doppler effect.

Electrostatics

Electric charges and their conservation. Coulomb's law – force between two point charges, forces between multiple charges; superposition principle and continuous charge distribution. Electric field, electric field due to a point charge, electric field lines; electric dipole, electric field due to a dipole; torque on a dipole in a uniform electric field. Electric flux, statement of Gauss's theorem and its applications to find field due to infinitely long straight wire, uniformly charged infinite plane sheet and uniformly charged thin spherical shell (field inside and outside).

Electric potential, potential difference, electric potential due to a point charge, a dipole and system of charges; equipotential surfaces, electrical potential energy of a system of two point charges and of electric dipoles in an electrostatic field. Conductors and insulators, free charges and bound charges inside a conductor. Dielectrics and electric polarisation, capacitors and capacitance, combination of capacitors in series and in parallel, capacitance of a parallel plate capacitor with and without dielectric medium between the plates, energy stored in a capacitor.

Current Electricity

Electric current, flow of electric charges in a metallic conductor, drift velocity and mobility, and their relation with electric current; Ohm's law, electrical resistance, V - I characteristics (linear and non-linear), electrical energy and power, electrical resistivity and conductivity.

Carbon resistors, colour code for carbon resistors; series and parallel combinations of resistors; temperature dependence of resistance. Internal resistance of a cell, potential difference and emf of a cell, combination of cells in series and in parallel. Kirchhoff's laws and simple applications. Wheatstone bridge, metre bridge.

Magnetic Effects of Current and Magnetism

Concept of magnetic field, Oersted's experiment. Biot - Savart law and its application to current carrying circular loop. Ampere's law and its applications to infinitely long straight wire, straight and toroidal solenoids. Force on a moving charge in uniform magnetic and electric fields. 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 a magnetic field; moving coil galvanometer – its current sensitivity and conversion to ammeter and voltmeter. 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; Magnetic elements. Para-, dia- and ferro - magnetic substances, with examples. Permanent magnets.

Electromagnetic Induction and Alternating Currents

Electromagnetic induction; Faraday's law, induced emf and current; Lenz's Law, Eddy currents. Self and mutual inductance. Alternating currents, peak and rms value of alternating current/voltage; reactance and impedance; LC oscillations (qualitative treatment only), LCR series circuit, resonance; power in AC circuits, wattless current. AC generator and transformer.

Electromagnetic Waves

Need for displacement current. Electromagnetic waves and their characteristics (qualitative ideas only). Transverse nature of electromagnetic waves. Electromagnetic spectrum (radio waves, microwaves, infrared, visible, ultraviolet, x-rays, gamma rays) including elementary facts about their uses.

Optics

Reflection of light, spherical mirrors, mirror formula. Refraction of light, total internal reflection and its applications, optical fibres, refraction at spherical surfaces, lenses, thin lens formula, lens-maker's formula. Magnification, power of a lens, combination of thin lenses in contact combination of a lens and a mirror. Refraction and dispersion of light through a prism.

Scattering of light – blue colour of the sky and reddish appearance of the sun at sunrise and sunset. Optical instruments: Human eye, image formation and accommodation, correction of eye defects (myopia and hypermetropia) using lenses. Microscopes and astronomical telescopes (reflecting and refracting) and their magnifying powers. Wave optics: Wavefront and Huygens' principle, reflection and refraction of plane wave at a plane surface using wavefronts.

Proof of laws of reflection and refraction using Huygens' principle. Interference, Young's double hole experiment and expression for fringe width, coherent sources and sustained interference of light. Diffraction due to a single slit, width of central maximum. Resolving power of microscopes and astronomical telescopes.

St. Xavier's College, Ranchi
an Autonomous College of Ranchi University
Entrance Test 2024

Programme	B.Sc. Physics (Honours)
No. of Seats	60
Question Pattern	The Paper consists of 70 multiple choice type questions on Class 11 th & 12 th level physics. The answers to the questions are to be marked on OMR sheet by darkening the appropriate circle with blue/black ball point pen only.
Duration of Test	2 hours
Syllabus	Class 11 th & 12 th Physics
Entrance Test Date & Time	
Last Date for filling the form	
Test Venue	St. Xavier's College, Ranchi
Selection Procedure	Merit list shall be prepared on total marks obtained by the candidates
Eligibility	50% marks in Physics and Maths also 50% aggregate marks in Intermediate/10+2. Maths is compulsory to apply for Physics (H)

Dual Nature of Matter and 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

Atoms and Nuclei

Alpha - particle scattering experiment; Rutherford's model of atom; Bohr model, energy levels, hydrogen spectrum. Composition and size of nucleus, atomic masses, isotopes, isobars; isotones. Mass-energy relation, mass defect; binding energy per nucleon and its variation with mass number; nuclear fission and fusion.

Electronic Devices

Energy bands in solids (qualitative ideas only), conductors, insulators and semiconductors; semiconductor diode – I - V characteristics in forward and reverse bias, diode as a rectifier; I - V characteristics of LED, photodiode, solar cell, Logic gates (OR, AND, NOT, NAND and NOR).

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Entrance Test Syllabus 2024

Syllabus	Description
Course	B.A. Political Science
No. of Seats	140
Question Pattern	<p>Question Paper shall have 2 sections.</p> <p><u>Section-A(MCQ)</u> 2 x 25 = 50</p> <p>This section shall 25 multiple choice type questions based on current affairs and fundamentals of Political Science .The multiple choice questions should be answered on OMR sheet by darkening the appropriate circle with blue / black ball point pen only. 2 marks will be given for correct answer.</p> <p><u>Section-B (Essay Writing either in English or Hindi)</u> 1x50= 50 Marks</p> <p>This section shall have list of burning topics. The candidate shall have to write an essay on any ONE of given topic. The candidate can write the essay either in English or Hindi bearing 50 marks.</p> <p>Full marks- 100</p>
Time	2 hours
Topics to be Covered	<ul style="list-style-type: none"> multiple choice type questions based on current affairs and fundamentals of Political Science Essay writing on burning topics of social, political and economic interest of national and international importance