

**3.31** अभ्यर्थी द्वारा जानकारी/समस्या के लिए टोल फ्री नम्बर 18002337899 पर सम्पर्क किया जा सकता है साथ ही परीक्षा सम्बन्धी कोई भी शिकायत पी.ई.बी. की E-mail ID [complain.peb@mp.gov.in](mailto:complain.peb@mp.gov.in) पर भेज सकते हैं।

## खण्ड-स

### 3.32 आवेदन पत्र भरने की समयावधि

ऑनलाईन आवेदन पत्र			ऑनलाईन आवेदन में संशोधन		
भरने की प्रारंभिक तिथि	भरने की अंतिम तिथि	भरने के कुल दिवस	करने की प्रारंभिक तिथि	करने की अंतिम तिथि	करने के कुल दिवस
14/09/2022	28/09/2022	15	14/09/2022	03/10/2022	20

### 3.33 आनलाईन परीक्षा का विवरण

परीक्षा दिनांक एवं दिन	परीक्षा की पाली	अभ्यर्थियों के लिये रिपोर्टिंग समय	महत्वपूर्ण निर्देश पढ़ने का समय	उत्तर अंकित का समय
29/10/2022 & 30/10/2022 शनिवार, रविवार	प्रथम	प्रातः 07:00- 08:00 बजे	08:50 से 09:00 बजे तक (10 मिनट)	प्रातः 09:00 से 11:00 बजे तक (2:00 घंटे)
	द्वितीय	दोपहर 01:00- 02:00 बजे	02:50 से 03:00 बजे तक (10 मिनट)	दोपहर 03:00 से 05:00 बजे तक (2:00 घंटे)

परीक्षा में हिन्दी/अंग्रेजी माध्यम में वस्तुनिष्ठ प्रकार के प्रश्न होंगे, जिनमें प्रत्येक प्रश्न के चार संभावित उत्तर/विकल्प दिये रहेंगे। परीक्षार्थी को सही उत्तर चुनकर उससे संबंधित गोले को कम्प्यूटर के माउस की सहायक से काला करना होगा।

### 3.34 (i) परीक्षा शुल्क :-

स.क्र.	प्रश्नपत्रों की संख्या	अनारक्षित श्रेणी के अभ्यर्थियों के लिये	अन्य पिछड़ा वर्ग/अनुसूचित जाति/अनुसूचित जनजाति के अभ्यर्थियों के लिये (म.प्र. के मूल निवासियों के लिये)	निःशक्तजन अभ्यर्थियों के लिये (म.प्र. के मूल निवासियों के लिये)	आवेदन पत्र जमा करने के लिये एम.पी ऑन लाईन का पोर्टल शुल्क
01.	एक	400/-	200/-	200/-	कियोस्क के माध्यम से भरने पर 60/- रस्टिड सिटीजन यूजर के माध्यम से भरने पर 20/-

### (ii) संशोधन किये जाने पर देय शुल्क

स.क्र.	प्रश्नपत्रों की संख्या	आवेदन पत्र में प्रत्येकवार संशोधन किये जाने पर शुल्क	आवेदन पत्र में प्रत्येकवार संशोधन किये जाने पर पोर्टल शुल्क
01.	एक	20/-	40/-

### 3.35 परीक्षा शहर :-

आवेदकों को आवेदन पत्र भरते समय चार परीक्षा शहरों का प्राथमिकता क्रम निर्धारित करना आवश्यक है। बोर्ड द्वारा अभ्यर्थी के प्राथमिकता में अंकित किये गये शहरों में सीटों की उपलब्धता के आधार पर Random प्रकार से परीक्षा केंद्र आवंटित किये जाने का प्रयास किया जावेगा। तथापि परीक्षा शहर एवं परीक्षा केन्द्रों की उपलब्धता के अनुरूप अभ्यर्थियों को भी वांछित परीक्षा शहर के स्थान पर अन्य परीक्षा शहर आवंटित किया जा सकता है। बोर्ड अपनी सुविधानुसार परीक्षा शहरों/केन्द्रों में परिवर्तन, कमी या वृद्धि कर सकता है एवं उक्त सम्बन्ध में पी ई बी का निर्णय अंतिम एवं बाध्यकारी होगा। अतः परीक्षा केंद्र परिवर्तन के सम्बन्ध में किसी प्रकार के आवेदन मान्य नहीं होंगे। लिखित परीक्षा निम्नलिखित परीक्षा शहरों/केन्द्रों पर आयोजित की जायेगी।

आनलाईन परीक्षा केन्द्र

1. भोपाल	2. इन्दौर	3. जबलपुर	4. ग्वालियर
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### खण्ड-द

#### ऑनलाइन परीक्षा प्रणाली के संबंध में निर्देश

### 3.36

- (i) अभ्यर्थी के प्रवेश पत्र पर उल्लेखित निर्धारित रिपोर्टिंग समय पर परीक्षा केन्द्र पर अभ्यर्थी की उपस्थिति अनिवार्य है।
- (ii) परीक्षा तिथि पर परीक्षा केन्द्र में अभ्यर्थी बायोमेट्रिक सत्यापन किया जाएगा। अभ्यर्थी के बायोमेट्रिक सत्यापन प्राप्त नहीं होने की स्थिति में उसे परीक्षा में बैठने की पात्रता नहीं होगी।
- (iii) बायोमेट्रिक के अतिरिक्त अभ्यर्थी को टी.ए.सी. के द्वितीय भाग की प्रविष्टियों को भरकर लाना अनिवार्य है।
- (iv) पी.ई.बी की वेबसाइट पर अभ्यर्थियों के लिये ऑनलाइन परीक्षा के मॉक टेस्ट की व्यवस्था उपलब्ध रहेगी, जिसका उपयोग कर आवेदक परीक्षा पूर्व, परीक्षा प्रक्रिया का अभ्यास कर सकता है।
- (v) पी.ई.बी. कार्यालय में भी आवेदक के लिये ऑनलाइन परीक्षा प्रक्रिया के अभ्यास की सुविधा उपलब्ध रहेगी।
- (vi) अभ्यर्थी को परीक्षा के दौरान प्रत्येक प्रश्न के लिये उपलब्ध चार विकल्प में से एक विकल्प का चयन उत्तर अंकित करने के लिये अनिवार्य होगा।
- (vii) पी.ई.बी. की वेबसाइट पर परीक्षा समाप्त होने के अगले दिवस प्रश्न पत्र एवं मॉडल उत्तर प्रदर्शित किये जायेगे जिसके आधार पर आवेदक प्रश्न एवं उनके उत्तर विकल्पों के संबंध में अपना अभ्यावेदन नियमानुसार निर्धारित प्रारूप में प्रस्तुत कर सकेगा।
- (viii) अभ्यर्थियों से प्राप्त अभ्यावेदनों पर विचार उपरान्त अंतिम उत्तर कुंजी (आदर्श उत्तर) तैयार किये जायेगे। जिसके आधार पर परीक्षा परिणाम तैयार कर घोषित किया जाएगा।
- (ix) ऑनलाइन आवेदक उपयोगकर्ता पहचान और पासवर्ड के द्वारा ही ऑनलाइन परीक्षा हेतु अभ्यर्थी अपना प्रवेश-पत्र प्राप्त कर सकते हैं। अतः आवेदक उपयोगकर्ता पहचान और पासवर्ड आवश्यक रूप से संभाल कर रखे जिसकी समस्त/जिम्मेदारी आवेदक की होगी।
- (x) परीक्षा का आयोजन एक से अधिक शिफ्ट में किये जाने की स्थिति में अभ्यर्थियों के स्कोर का Normalisation करने का प्रावधान पी.ई.बी. के पास सुरक्षित रहेगा।
- (xi) नियम पुस्तिका में परीक्षा आयोजन का समय परिस्थितियों के अनुसार परिवर्तन/संशोधन किया जा सकता है।
- (xii) परीक्षा आयोजन की निर्धारित तिथि में परिस्थिति अनुसार परिवर्तन किया जा सकता है तथा परीक्षा का आयोजन निर्धारित तिथि के पूर्व या पश्चात भी किया जा सकेगा।
- (xiii) अभ्यर्थी को केवल मूल फोटो युक्त पहचान पत्र प्रस्तुत करने पर ही परीक्षा में बैठने की पात्रता होगी। ई-आधार कार्ड का प्रिन्ट आउट यू.आई.डी.ए.आई.(UIDAI) के द्वारा सत्यापित होने पर ही ई आधार मान्य होगा।

(xiv) परीक्षा में निर्धारित रिपोर्टिंग समय के पश्चात आने वाले अभ्यर्थियों को परीक्षा केन्द्र में प्रवेश की पात्रता नहीं होगी।

अध्याय-4  
**i k B ; Ø e (SYLLABUS)**  
**(A) BIOLOGY**

**1. Botany**

Diversity in Living Organisms: Tools for study of Taxonomy – Museum, Zoos, Herbaria, Botanical Garden.

Biological classification: Five Kingdom classification, Binomial nomenclature, External morphology and life cycle of *Spirgyra*, *Mucor*, *Funaria*, *Selaginella* and *Pinus*. Salient features and classification of Monera, Protista, Fungi, plants and animals into major groups. Lichens, Viruses and viroids.

Classification of plants into major groups- Algae, Bryophyta, Pteridophyta, Gymnospermae and Angiospermae.

Difference between Prokaryote and Eukaryotes; Structure, reproduction and economic importance of Mycoplasma, Bacteriophage, Bacteria and Cyanobacteria.

Structural organization of cell: Cell theory, Light and Electron Microscopic view of cell (plant and animal), Structure and functions of cell organelles- Nucleus, Mitochondria, Chloroplast, Endoplasmic reticulum, Golgi complex, Lysosome, microbodies, microfilaments, Ribosome, Centrioles and Vacuoles, Plastid, Eukaryotic Chromosome (Morphology), cell and plasma membrane; difference between plant and animal cell, cell division, cell cycle, significance of mitosis and meiosis.

Biomolecules: Structure, function, chemical nature, mode of action and importance of carbohydrates, proteins, lipids, nucleic acids, enzymes and growth hormones with reference to their classification.

**Reproduction in Plants:** Asexual and Sexual- Binary fission, Sporulation, budding, gemmules, fragmentation and Vegetative propagation of plant, elementary sequence of developmental process, Pollination, Apomixes, Parthenocarpy, Elementary knowledge of microsporogenesis, megasporogenesis, fertilization, endosperm and embryo development in Angiosperms.

Pollination types, Out breeding devices, Pollen Pistil Interaction, Double Fertilization, Post Fertilization events, development of seed and formation of fruit.

Tissues, Anatomy and functions of different plant parts - root, stem, leaf, inflorescence (cymose and racemose), flower, fruit and seed.

**Plant Physiology:**

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.

**Mineral Nutrition:** Essential minerals, macro and micro nutrients and their role; deficiency symptoms; mineral toxicity; elementary idea of hydroponics as a method to study mineral nutrition; nitrogen metabolism, nitrogen cycle, biological nitrogen fixation.

**Photosynthesis:** Photosynthesis as a means of autotrophic nutrition, site of photosynthesis, pigments involved in photosynthesis, photochemical and biosynthetic phases of photosynthesis, cyclic and non cyclic photophosphorylation, Chemiosmotic hypothesis, Photorespiration, C<sub>3</sub> and C<sub>4</sub> pathways, factors affecting photosynthesis.

**Respiration:** Exchange of gases, Cellular respiration- glycolysis, fermentation (anaerobic), TCA cycle and electron transport system (aerobic); energy relations- number of ATP molecules generated, amphibolic pathways, respiratory quotient.

**Plant growth and development:** Seed germination, phases of plant growth and plant growth rate, conditions of growth; differentiation, dedifferentiation and redifferentiation; sequence of developmental process in a plant cell, growth regulators- auxin, gibberellin, cytokinin, ethylene, ABA; seed dormancy, vernalisation, photoperiodism.

**Biodiversity and its conservation:** Concept of Biodiversity, patterns of Biodiversity, importance of Biodiversity, loss of biodiversity, hotspots, endangered organism, extinction, Red data book, biosphere reserves, National Park and Sanctuaries.

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

**Environmental Issues:** Agrochemicals and their effects, radioactive waste management.

**Ecosystem:** Patterns, components, productivity and decomposition, Energy flow, pyramids of number, biomass, energy, nutrient cycles (carbon and phosphorous), ecological succession, ecological services-carbon fixation, pollination, oxygen release.

Structures and functions of major ecosystems i.e. lake and forest, Food chain, food web, energy flow, Ecological crisis – Role of man in polluting environment (Air, Water and Soil). Biodiversity and its conservation, deforestation, Green house effect, Global warming, Ozone depletion.

**Role of plants in human welfare:** A general knowledge of plant products of economic value, Drugs, Fibres, Cereals; Improvement in food production, Plant breeding, Depletion, biofortification, Animal husbandry.

## **2. Zoology**

**Classification:** Classification of animals non chordates up to phyla level and chordates up to class level.

**Multicellularity:** Structure and Function of Animal Life.

**Structure and function of Animal tissues:** Epithelial, Connective, Muscular, Skeletal and Nervous.

Morphology, anatomy and functions of different systems (digestive, circulatory, respiratory, nervous and reproductive) of cockroach.

**Developmental Biology and Genetics:** Principle of Heredity and variation, Pleiotropy elementary idea of polygenic inheritance, Mendelism, Mendel's Laws of inheritance, Incomplete dominance, Co-dominance, Multiple alleles, Sex linked inheritance, Chromosomes, Types of chromosome, Human karyotype and chromosomal abnormalities and syndromes, Hormonal, Chromosomal and Genic Balance theory of sex determination, Sex linkage and sex linked inheritance in man, Monohybrid and dihybrid cross, linkage and crossing over of genetic material, Structure of DNA and RNA, DNA replication, genetic code, transcription, translation and gene regulation, mutation, gene mutation.

Gene expression and regulation, Lac-Operon, Genome and human genome project, DNA fingerprinting.

**Human Reproduction:** Female reproductive cycles in mammals, gametogenesis along with structure of sperm and ovum, Types of eggs, Fertilization, Cleavage-types of cleavage and blastula, development of mammals up to three germinal layers, foetal membrane, structure and functions, growth, repair and ageing, amniocentesis, implantation, Pregnancy and Placenta formation, Parturition and Lactation.

**Development of population and environment:** Human population, natality, mortality, sex ratio, population explosion; dynamics of human life with respect to food supply, housing, health and standard of living; impact of population problems and their control

**Biotechnology-Principles and Processes:** Genetic Engineering (Brief idea).

Applications of biotech in health and agriculture: Human insulin, Vaccines, Gene therapy; Genetically modified organisms-Bt Crops, Transgenic Animals, Biosafety issues, Biopiracy and patents.

Strategies for Enhancement in Food Production: Improvement in varieties of wheat, rice, pulse (gram), oil seeds (Ground nut), sugarcane; Animal Husbandry, Tissue culture, Principle of plant breeding and its role in improvement of crops. Industrial manufacture of Cheese, Yoghurt, Alcohol. Food preservation –methods and importance.

Microbes in Human Welfare: In household food processing, sewage treatment, energy generation, as biocontrol agents and biofertilizer, Antibiotics

**Evolution:** Origin of life, Biological evolution and evidences for biological evolution (paleontology, comparative anatomy, embryology and molecular evidence), Darwin's contribution, Modern Synthetic theory of Evolution, Mechanism of evolution-Variation and Natural Selection with examples, Types of natural selection, Gene flow and genetic drift, Hardy-Weinberg's principle, Adaptive Radiation, Human evolution.

**Economic Zoology:** Sericulture, Apiculture, Lac culture, Poultry, Fishery and Pearl industry.

**Health and Disease:** Protozoan diseases in relation to man, Insect carrying diseases in relation to man, Cancer-types of cancer and cancer cell, Communicable diseases (Hepatitis, AIDS), STD, Immune Response, Vaccines and antisera, Allergies, Smoking, alcoholism and drug addiction.

**Human Physiology:**

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; Caloric value of proteins, carbohydrates and fats; Egestion; Nutritional and digestive disorders – Protein–energy malnutrition (PEM), indigestion, constipation, vomiting, jaundice, diarrhoea.

Breathing and Respiration: Respiratory organs in animals, Respiratory system in humans, Mechanism of breathing and its regulation in humans- exchange of gases, transport of gases and regulation of respiration, respiratory volume; Disorders related to respiration-asthma, emphysema, occupational respiratory disorders.

Body fluids and circulation: Composition of blood, blood groups, coagulation of blood; Composition of lymph and its function, Human circulatory system-Structure of human heart and blood vessels, Cardiac cycle, cardiac output, ECG, Double circulation, Regulation of cardiac activity, Disorders of circulatory system-hypertension, coronary artery disease, angina pectoris, heart failure.

Excretory products and their elimination: Modes of excretion- ammonotelism, ureotelism, uricotelism; Human excretory system-structure and function; Urine formation, Osmoregulation, Regulation of kidney function-Renin-angiotensin, Atrial Natriuretic Factor, ADH and Diabetes insipidus; Role of other organs in excretion, Disorders- uraemia, renal failure, renal calculi, nephritis; Dialysis and artificial kidney.

Locomotion and Movement: Types of movement- ciliary, flagellar, muscular; Skeletal muscle- contractile proteins and muscle contraction; Skeletal system and its functions; Joints; Disorders of muscular and skeletal system-myasthenia gravis, tetany, muscular dystrophy, arthritis, osteoporosis, gout.

Neural control and coordination: Neuron and nerves; Nervous system in humans- central nervous system, peripheral nervous system and visceral nervous system; Generation and conduction of nerve impulse; Reflex action; Sense organs; Elementary structure and functions of eye and ear.

Chemical coordination and regulation: Endocrine glands and hormones; Human endocrine system- Hypothalamus, Pituitary, Pineal, Thyroid, Parathyroid, Adrenal, Pancreas, Gonads. Mechanism of hormone action; Role of hormones as messengers and regulators, Hypo- and hyperactivity and related disorders; Dwarfism, Acromegaly, Cretinism, Goiter, Exophthalmic Goiter, Diabetes, Addison's disease.

## **(B) PHYSICS**

Physical World and Measurement: Accuracy and precision of measuring instruments, errors in measurement, significant figures.

Units and Dimensions: Dimensional Analysis, S.I. Units,

Kinematics: Motion in straight line, Elementary concepts of differentiation and integration for describing motion, Uniformly accelerated motion, Velocity time and position time graph, Scalars and Vectors quantities, Addition and subtraction of vectors, Scalar and vector product of vectors,

Resolution of a vector in plane-rectangular components, Unit Vector, Non uniform motion, Average speed and instantaneous velocity,

Laws of Motion: Equilibrium of concurrent forces, Force and inertia, Newton's law of motion, Conservation of momentum, Motion in two dimensions, Projectile motion and Uniform circular motion, Static and Kinetic friction, Laws of friction, rolling friction, lubrication centripetal force, examples of circular motion (vehicle on a level circular road, vehicle on banked road)

Work, Energy and Power: Power, Conservative forces, Conservation of mechanical energy (kinetic and potential energies), non conservative forces, motion in a vertical circle, work energy theorem, potential energy of spring, elastic and non elastic collisions.

Gravitation: Kepler's laws of planetary motion, Universal law of gravitation, acceleration due to gravity and its variation, Gravitational potential energy and gravitational potential, Escape velocity, Orbital velocity of a satellite, Geo stationary satellites.

Motion of system particles and rigid bodies: Conservation of momentum, Centre of mass of two and multi particle system, Rigid body rotation, Moment of inertia, Theorems of perpendicular and parallel axes, Values of moment of inertia for simple geometrical objects, Moment of force, Torque, Angular momentum, Laws of conservation of Angular momentum with some examples. Equilibrium of rigid bodies, Equation of rotational motion, Comparison of linear and rotational motion, radius of gyration.

Properties of Bulk matter: Elastic behavior, Stress strain relationship, , Poisson's ratio, Elastic Energy, Reynolds number, Application of surface tension idea to drops, bubbles and capillary rise; Anomalous expansion, Hooke's law, Young's modulus, Bulk modulus, shear modulus of rigidity, Viscosity, Stoke's law, terminal velocity, Streamline and turbulent flow, Critical velocity, Bernoulli's theorem and its applications, Surface energy, Surface tension, angle of contact, excess of pressure across a curved surface.

Thermodynamics: Zeroth law of thermodynamics, Heat, Internal energy, First law of thermodynamics, Isothermal and adiabatic processes, Second law of thermodynamics, Heat engine and Refrigerator.

Kinetic theory of gases: Concept of pressure, kinetic energy and temperature, Law of equipartition of energy, Specific heat capacity of gases.

Thermal Properties of Matter: Heat, temperature, thermal expansion, Specific heat capacity,  $C_p$  and  $C_v$ - Calorimetry; Change of state, Heat transfer-conduction, convection and radiation; Thermal conductivity, Black body radiation, Stefan's law and Newton's law of cooling.

Oscillation and Waves: Periodic motion-time period, Frequency, displacement as a function of time, Periodic function. Force constant, Simple pendulum derivation of expression for its time period, resonance, Simple Harmonic Motion (SHM), Phase, Oscillations of spring and simple pendulum, energy in SHM; Free, forced and damped oscillations; wave motion, progressive wave equation, superposition of waves, standing waves in strings and organ pipes, Beats, Doppler effect.



Electrostatics: Electrical charge and their conservation, force between multiple charges, Electric field lines, electric dipole, electric field due to a dipole, torque on a dipole in a uniform electric field, Electric flux, potential difference, equipotential surfaces, Conductors and insulators, free charges and bound charges inside a conductor, Dielectrics and electric polarization, Combination of capacitors in series and in parallel, Coulomb's law of electrostatics, Electric field due to point charge, Gauss's theorem and its applications in simple geometrics, Electric potential due to a point charge, a dipole and a system of charges; Dielectrics, Capacitors, Parallel plate capacitor with and without dielectric medium between the plates, Capacitors in series and parallel, energy stored in capacitor, Van de Graff generator.

Current Electricity: Flow of electric charges in a metallic conductor, Potential difference, combination of cells in series and parallel for comparing emf of two cells, measurement of internal resistance of a cell, Electric current, drift velocity, mobility, Ohm's law, electrical energy and power, Colour code for carbon resistors, temperature dependence of resistance, Internal resistance of cell, electromagnetic force, Primary and secondary cells, Kirchhoff's laws, Wheatstone bridge, Metre Bridge, Potentiometer and its applications.

Magnetic effect of current and Magnetism: Oersted's experiment, electric field, concept of magnetic field, earth magnetic field and magnetic element, torque experienced by a current loop in uniform magnetic field, Biot-Savart's law and its application to circular current carrying loop, Ampere's law and its applications for solenoid and toroid, Force on a moving charge in a magnetic field, Cyclotron, Force on a current carrying conductor, Moving coil galvanometer, Conversion to Ammeter and Voltmeter, Current loop as a magnetic dipole, magnetic dipole moment, Bohr magneton, Magnetic field intensity due to a dipole along its axis and perpendicular to its axis, neutral points, bar magnet as an equivalent solenoid, Torque on a magnetic dipole; Para, dia and ferro magnetic substances; electro magnets and permanent magnets.

Electromagnetic Induction and Alternating Currents: Electro magnetic induction, Resonance, power in AC circuits, Wattless current, Faraday's laws, Lenz's law, Eddy currents, self and mutual induction, Alternating currents, rms value of alternating current/voltage, reactance, impedance, LCR series circuits, LC oscillations, AC generator and Transformer.

Electromagnetic waves: Displacement current, Bose and Hertz experiment, Characteristics of e.m. waves, transverse nature, electromagnetic spectrum, elementary facts and their uses, propagation of electromagnetic waves, Ground waves, Sky waves, Satellite communication and Remote sensing.

Optics: Magnification power of lens, Coherent and sustained source, Reflection of light, spherical mirrors, Refraction of light, total internal reflection, Optical fibres, Refraction at spherical surface, lens maker's formula, combination of thin lenses in contact combination of lens and a mirror, refraction and dispersion of light through a prism, scattering of light- blue colour of sky and reddish appearance of the sun at sunrise and sunset, Optical instruments, Compound microscope and Astronomical telescope, terrestrial telescope and reflecting telescope, Resolving power of microscope and telescope, Human eye, Correction of eye defects – myopia and hypermetropia.

Wave optics: Huygen's Principle, reflection and refraction of light using Huygen's Principle, Interference, Young's double slit experiment, Diffraction due to a single slit, Polarisation, Methods of production of polarised light, Law of Malus, Brewster's law, Polaroids and their applications.