UNIVERSITYOF MYSORE
Yuvaraja's College, Mysore
(A constituent autonomous college of University of Mysore)
College with Potential for Excellence

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Date:04/08/2020

ADMISSION NOTIFICATION 2020-21

Yuvaraja's college a constituent college of University of Mysore invites application from eligible students who have passed PUC or Equivalent in the prescribed form for admission to the **FIVE YEAR INTEGRATED M.Sc. in MOLECULAR BIOLOGY COURSE** for the year **2020-2021.**

Eligibility:

Candidates who have completed two-year Pre University course of Karnataka state or 10+2 or equivalent with science subjects as optionals and have secured at least 45% average marks in the optional papers (5% relaxation for SC/ST) with a minimum of 45% marks in Biology.

GENERAL INSTRUCTIONS

1. Application form is available online at ycm.uni-mysore.ac.in
2. An online payment of Rs. 500/- (Rs.200/- towards application fees and Rs. 300 towards Entrance Examination fees should be made. It is mandatory that the student takes a printout of the filled in application and the fee paid receipt. In case of failure in Online Payment procedure the student is required to contact the home branch where his/her account exists.
3. The candidate seeking admission to 5-Year Integrated M.Sc. course in Molecular Biology shall have to appear for Entrance Examination.
4. When the application is being submitted it is required to upload the Caste certificate with validity for the year 2020-21, failing which the student would be considered for admission under General Merit only. The caste certificates submitted after the last date for submission of applications would not be valid.
5. When the application is being submitted it is required to upload the income certificate of the parents with validity for the year 2020-21.

6. When the application is being submitted it is required to upload the S.S.L.C Marks card, II P.U Provisional Marks card (Internet copy /Provisional marks card), latest passport size photo and the soft copy of the signature of the student.`

7. Those students who have studied 11th & 12th std under CBSE, ICSE scheme and other than karnataka pre-university examination board students are required to produce the eligibility certificate issued by the university of Mysore, Mysuru at the time of counselling cum admission.

8. Last date for applying is 31st August 2020 before 5.30 PM

9. Entrance Examination: A compulsory Entrance examination is conducted in the college itself to the students seeking admission to the 5 Year integrated M.Sc. Molecular Biology program. Date and details of the examination will be intimated later in the Yuvaraja's College website.

10. Tentative Calendar of events for admission to 5-Year Integrated M.Sc., in Molecular Biology

1.

Sl. No	Events	Dates
1.	Issue of Notification	04-08-2020
2.	Issue of Applications from	05-08-2020
3.	Last date for issuing and submission of Applications	29-08-2020
4	List of Eligible Candidates for Entrance Exam	02-09-2020
5.	Conduct of Entrance Examination	Will be intimated Later in Yuvaraja's College website and Notice Board
6.	Announcement of Result (Provisional Merit List of Candidates)	
7.	Admission of Candidates through counselling from the Merit Listed candidates (both Scheme A and B)	

11. Entrance Examination is conducted for a maximum of 50 marks. 50 Multiple choice questions (MCQs) with 1 mark for each question (Question paper contains 30 questions from Biology, 10 Questions from Chemistry and 5 Questions from Physics and 5 questions from Mathematics)

12. Merit list will be prepared by taking 50% of the marks scored in the optional subjects in the qualifying examination (PUC/10+2/equivalent) and the marks scored out of 50 obtained in the Entrance examination
13. Entrance examination syllabus is based on the PUC/10+2/equivalent syllabus content and it is uploaded in the website
14. Instructions related admission procedure will be uploaded in the website along with the Merit list to be prepared after the entrance examination.

Sd/-

Principal

Booklet No. 026

Entrance Examination

5 year Integrated M. Sc Course in Molecular Biology June 2019

Date: 13-06-2019 Time: 11-30 am to 12-30 pm

Register Number	Y	M	B	1	9			

Instructions to candidates

1. Write the **Register Number** on **the Answer sheet & Question Booklet.**
2. Write the **Booklet Number** on the **Answer sheet.**
3. Get the **entries verified** by the **Room Invigilator** and get the **signature**.
4. Read the "**instructions to the candidates**" printed on the answer sheet before answering.
5. **Don't Open** the Question Booklet **before 11-30 AM.**
6. **Don't use pencils** for marking the answers**. Only Blue/Black ball point pen** shall be used**.**
7. Only the space provided at the end of each page for "**Rough Work**" shall be used if needed.
8. Stop answering at 12-30 Noon. Handover the **Answer sheet & Question Booklet** to the Room Invigilator before leaving the examination hall.

PART –A Biology

1. The bacteria *Escherichia coli* consists of
   a) One linear chromosome
   b) One circular chromosome
   c) One linear and one circular chromosomes
   d) Does not contain chromosomes

2. Which of the following are common in chloroplasts and mitochondria?

   a) Both are present in animal cells
   b) Both of them require light for their activity
   c) Both are present in prokaryotic cells
   d) Both have their own genetic material

3. Which of the cell organelles are devoid of DNA?

   a) Nucleus and mitochondria
   b) Mitochondria and chloroplasts
   c) Chloroplasts and nucleus
   d) Lysosomes and dictyosomes

4. The motile bacteria are able to move because they posses

   a) Cilia
   b) Flagella
   c) Fimbriae
   d) Pili

5. In an operon, the promoter consists of,

   a) An operator, a regulator, an inhibitor
   b) An operator, a regulator, a repressor,
   c) A Tata box, Cap binding site, RNA ploymerase binding site
   d) An activator, an operator, a regulator

Space for Rough Work

6. Which of the following statements about meiosis is true?

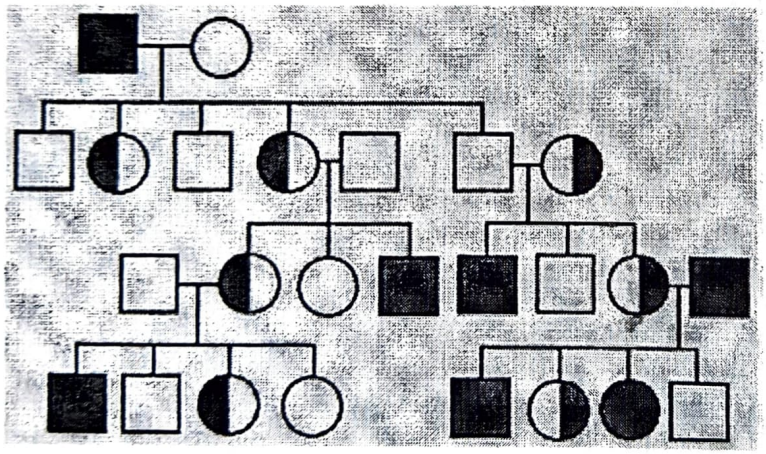
a) A single cell gives rise to two identical daughter cells
b) The daughter nuclei are genetically identical to the parent nucleus
c) The centromeres separate at the onset of anaphase
d) Homologous chromosomes synapse in the first prophase

7. Nucleolus is the site of synthesis of

a) DNA
b) mRNA
c) rRNA
d) tRNA

8. Accumulation of glucose-6-phosphate inhibits the activity of glucohexokinase. This is an example of,
a) Competitive inhibition
b) Feed back inhibition
c) Allosteric inhibition
d) Both feed back inhibition and allosteric inhibition

9. The following is the pedigree of a human genetic disorder. It relates to,



a) Sex linked recessive disorder
b) Autosomal recessive disorder
c) Autosomal dominant disorder
d) Chromosomal aneuploidy

Space for Rough Work

10. Golgi apparatus is absent in

a) RBC
b) WBC
c) Liver cells
d) Nerve cells

11. A Turner syndrome originates due to,

a) A chromosomal nondisjunction during mitosis
b) A chromosomal nondisjunction during meiosis
c) A mutation on the sex chromosomal gene
d) A mutation on the autosomal gene

12. The hydrochloric acid present in the gastric juice is secreted by

a) Oxyntic cells
b) Zymogen cells
c) Kupffer cells
d) All these

13. The semiconservative method of DNA replication was confirmed by,

a) Watson and Crick
b) Rosalind and Wilkins
c) Messelson and Stahl
d) Jacob and Monad

14. Which one of the following statements is correct regarding the blood pressure?
a) 130/90 mmHg is considered as high and requires immediate treatment
b) 100/55 mmHg is considered as ideal blood pressure
c) 105/50 mmHg makes one very active
d) 190/110 mmHg may harm vital organs like brain and kidney

Space for Rough Work

15. Match the items given under column I with those under column II and select the correct option from the answer key given;

	Column I		Column II
A	Reaction centre of pigment system I	p	P700
B	Reaction centre of pigment system II	q	P680
C	Primary acceptor of electrons from PS I	r	Pheophytin
D	Primary acceptor of electrons from PS II	s	FRS
		t	NADP

a) A=q, B=p, C=r, D=s
b) A=p, B=q, C=s, D=r
c) A=q, B=p, C=s, D=r
d) A=t, B=p, C=s, D=r

16. During industrialization in England, the light coloured peppered moth *Biston betularia* gets changed to its darker melanic variety due to,

a) Translocation of block of genes in response to heavy carbons
b) Deletion of gene segment due to industrial pollution
c) Mutation of a single gene that got inherited in Mendelian fashion for survival in smoke laiden industrial environment
d) Industrial carbon deposited on the wings and the body

17. In the following, a statement of Assertion (A) is given followed by a corresponding statement of Reason (R).

Assertion: Gametogenesis is the process of production of gametes through meiosis
Reason: In oogenesis, polar bodies are formed.

Of these statements, mark the correct answer with,
a. Both assertion and reason are true and the reason is the correct explanation for the assertion.
b. Both the assertion and the reason are true but the reason is not the correct explanation for the assertion.
c. The assertion is true but the reason is false.
d. Both the assertion and the reason are false.

Space for Rough Work

18. Identify the hormones not involved in the regulation of menstrual cycle in humans,

a) FSH, LH, ICSH
b) GH, TSH, Melatonin
c) FSH, LH, Progesterone
d) FSH, LH, Estrogen

19. After the rediscovery of Mendelian principles in the year 1900, many biologists tried to apply the laws of heredity using different plants and animals. Unfortunately they did not get the 3:1 or 9:3:3:1 ratio. The reason was,

a) Mendelian principles were just exceptions and not true
b) It proved that the heredity is blending type
c) It happened because of the origin of new mutations
d) It was due to interaction of genes at the time of their functioning

20. The chances of occurrence of an O blood group child from the parents belonging to A and B group is,

a) Zero percent
b) 25%
c) 50%
d) 75%

21. Two genes R and Y are very closely linked on a chromosome. What would be the proportion of offspring of a test cross of a cross between RRYY and rryy.
a) Independent assortment with a ratio of 9:3:3:1
b) Higher number of recombinant types
c) Higher number of parental types
d) Assortment in the proportion of 1:1:1:1

22. A nucleosome contains,

a) DNA
b) DNA+RNA
c) DNA+Histones
d) DNA+RNA+Histones

Space for Rough Work

23. In the DNA fingerprinting technique developed by Alec Jeffrey, the probe used was,

a) SNP
b) RFLP
c) VNTR
d) tRNA

24. The biogenetic law which states that 'Ontogeny recapitulates Phylogeny' was proposed by,

a) Ernst Haeckel
b) Carolus Linnaes
c) Baptiste Lamarck
d) Fransisco Redi

25. The arrangement of fossils of human in the chronological order should be,

a) Homo habilis, Australopithecus afarensis, Homo erectus, Homo neanderthalensis, Homo sapiens.
b) Australopithecus afarensis, Homo habilis, Homo erectus, Homo neanderthalensis, Homo sapiens.
c) Australopithecus afarensis, Homo erectus, Homo neanderthalensis, Homo habilis, Homo sapiens.
d) Australopithecus afarensis, Homo neanderthalensis, Homo habilis, Homo erectus, Homo sapiens.

26. Which one of the following is being used in Polymerase Chain Reaction?

a) DNA polymerase
b) Restriction endonuclease
c) Taq polymerase
d) RNA polymerase

27. The major biomes of India are,

a) Deciduous forest, Desert, Sea coast, Tropical rain forest
b) Sub-tropical forest, Desert, Sea coast, Alpine region
c) Tropical rain forest, Sea coast, Deciduous forest, Alpine region
d) Sea coast, Deciduous forest, Sub-tropical forest, Tundra

Space for Rough Work

28. Identify the top carnivores among the following,

a) Insectivorous plants
b) Fox
c) Hagfish
d) Carnivores not eaten by others

29. Which one of the following is the endangered species in India?

a) Horse
b) Elephant
c) Indian wild ass
d) Tortoise

30. Chemical that contributes to the destruction of ozone layer of the earths surface,

a) Sulphur dioxide
b) Mercury
c) Carbon dioxide
d) Chloroflurocarbon

Space for Rough Work

PART B. Chemistry

31. The electron identified by quantum numbers n and *l*
i) n = 4, *l* = 1 ii) n = 4, *l* = 0 iii) n = 3, *l* = 2 iv) n = 3, *l* = 1, can be placed in order of increasing energy from the lowest to highest as'

a) iv < ii < iii < i
b) ii < iv < i < iii
c) i < iii < ii < iv
d) iii < i < iv < ii

32. A body of mass *x* kg is moving with a velocity of 100 ms^{-1}. Its de Broglie wavelength is $6.62x10^{-35}m$. Hence, *x* is: ($h= 6.62x10^{-34}Js$)

a) 0.25 kg
b) b) 0.15 kg
c) c) 0.2 kg
d) d) 0.1 kg

33. In which of the following arrangements, the sequence is not strictly according to the property written against it?

a) $CO_2 < SiO_2 < SnO_2 < PbO_2$: increasing oxidizing power
b) HF < HCl < HBr < HI : increasing acid strength
c) $NH_3 > PH_3 < AsH_3 < SbH_3$: increasing basic strength
d) B < C < O < N : increasing first ionization enthalpy

34. The number of σ *and* π – bonds in
$CH_2 = CH - CH = CH - C{\equiv}CH$ are

a) 10 and 2
b) 4 and 3
c) 11 and 3
d) 9 and 2

35. Peroxide ion
I) Has five completely filled anti bonding molecular orbitals
II) Is diamagnetic
III) Has bond order one
IV) Is isoelectronic with neon
Which one of these is correct?

a) II and III
b) I and II
c) I,II and III
d) I and IV

Space for Rough Work

36. The complex that exists as a pair of enantiomers is (ans-)

a) *trans* – $[Co(H_2NCH_2CH_2NH_2)Cl_2]^+$
b) $[Co(H_2NCH_2CH_2NH_2)_3]^{3+}$
c) $[Pt(PPh_3)Cl)Br)(CH_3)]^-$
d) *cis* $[Co(NH_3)_4Cl_2]^+$

37. How many faradays are required to reduce one mole of MnO_4^- to Mn^{+2}

a) 2
b) 3
c) 4
d) 5

38. Identify the incorrect statement regarding a half cell

a) A half–cell by itself causes movement of charges.
b) Once equilibrium is reached between the electrodes and the solution, there is no further net displacement of charges.
c) Different metal/metal ion combinations would have different electrode potential.
d) To have a net flow of current, two half-cells are to be combined such that the electrons removed from one electrode is fed to the other electrode.

39. Glyscosidic linkage is present between the two glucose units at positions ..... in maltose

a) 1,2
b) 1,3
c) 1,4
d) 1,1

40. In DNA, the complementary bases are :

a) Uracil and adenine : Cytosine and Guanine
b) Adenine and Thymine : Guanine and Cytosine
c) Adenine and Thymine : Guanine and Uracil
d) Adenine and Guanine : Thymine and Cytosine

Space for Rough Work

PART C Physics

41. A body A is at rest and a body B is moving at uniform velocity of 40 ms^{-1}. Force F_1 acts on A and F_2 acts on B for 10 seconds. The velocity of A and B now is 40 ms^{-1} and 80 ms^{-1} respectively. If A and B have equal mass, then

a) $F_1 = F_2$
b) $F_1 = 2F_2$
c) $F_2 = 2F_1$
d) $F_1 = \frac{F_2}{4}$

42. The human heart pumps 4×10^{-3} m^3 of blood through the arteries per minute at a pressure of 13 cm of mercury. If the density of mercury is 13.6×10^3 kg m^{-3}, the power of the heart is

d) 1.155 W
e) 1.155 HP
f) 2.3 W
g) 0.1155 HP

43. A light ray passes from air to a medium of refractive index *n*. If the angle of incidence is found to be twice that of angle of refraction, the angle of incidence is

a) $2\sin^{-1}(n)$
b) $2\sin^{-1}(n/2)$
c) $2\cos^{-1}(n/2)$
d) $\cos^{-1}(n/2)$

44. Two plane mirrors are inclined to each other at an angle of 60°. A point object is placed in between them. The total number of images produced by both the mirrors is

a) 2
b) 4
c) 5
d) 6

45. A person cannot clearly see distances more than 40 cm. He is advised to use lens of power

a) – 2.5 D
b) 2.5 D
c) – 6.25 D
d) 1.5 D

Space for Rough Work

PART –D Mathematics

46. If the sides of a triangle are 7, 5 and 3, then the greatest possible angle is

a) 90^0
b) 120^0
c) 150^0
d) 135^0

47. If W is a cube root of unity, then $(1-W)(1-W^2)(1-W^4)(1-W^8)$ is ,

a) W
b) 3
c) 1
d) 9

48. Total number of four digit odd numbers that can be formed using 0, 1, 2, 3, 5, 7 if repeatition is allowed is,

a) 216
b) 375
c) 400
d) 720

49. If {x} denotes fractional part of x, then $\left\{\frac{3^{200}}{8}\right\} =$

a) $\frac{1}{8}$
b) $\frac{3}{8}$
c) $\frac{5}{8}$
d) $\frac{7}{8}$

50. If centroid of a triangle is (3,1), one of the vertices is (0,-3) , Then the length of median is,

a) 5
b) $\frac{15}{2}$
c) 15
d) $\frac{10}{3}$

Space for Rough Work

Space for Rough Work

Annexure 1.

Entrance Examination for integrated M.Sc. in Molecular Biology

Duration of Entrance Examination: 1 Hr
Pattern: 50 Multiple choice questions of 1 mark each
Biology - 30, Chemistry-10, Physics -5 and Mathematics 5 questions
Syllabus: Based on Karnataka state Pre University Course Syllabus (XI and XII) (Both 1 and 2 year)

Syllabus :

UNIT I: CELL: STRUCTURE AND FUNCTION - Cell and its three major parts: Cell Membrane, cytoplasm, nucleus - Cell theory and the cell as the basic unit of life - Structure of the Prokanyotic and eucaryotic cell - Plant cell and animal cell (brief) - Cell Organelles:Cell envelope, cell membrane, cell wall structure and function: mitochondria, Golgi bodies/dictyosomes, endoplasmic reticulum, ribosomes, lysosomes, vacuoles, plastids, microbodies - Cytoskeleton, cilia, flagella, centrioles (Ultrastructure and function) - Nucleus: nuclear membrane, chromatin, nucleolus - Chemical constituents of living cells - Biomolecules: Structure and functions of carbohydrates, proteins, fats, lipids and nucleic acids - Enzymes: types, properties, function and enzyme action - Cell division: Cell cycle, significance of, and differences between Mitosis and Meiosis

UNIT II: PLANT PHYSIOLOGY Movement of water, food, nutrients and gases - Absorption 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 - Apoplant, symplast, root pressure, transpiration pull - Transportation and Guttation - Opening and closing of stomata - Role of K+ ions -Uptake of mineral and their translocation - Transportation through xylem and phloem -Plants and mineral nutrition - Essential minerals, macro- and micronutrients and their role - Defficiency symptoms - Mineral toxicity - Elementry idea of Hydroponics as a Method to study mineral nutrition - Nitrogen metabolism: Nitrogen cycle, biological nitrogen fixation -Plants Respiration - Exchange of gases - Cellular respiration: glycolysis, fermentation (anaerobic) - Energy Relation: Number of ATP molecules generated - Amphibiotic pathways - Respiratory quotient of nutrients - Photosynthesis - Autotropic nutrition - Site of photosynthesis - Photosynthetic pigments (Elementary idea) - Photosynthetic and biosynthetic phases of photosynthesis - Cyclic and non-cyclic photophosphorylation - Chemismotic hypothesis - Phototrespiration - C and C pathways - Factors affecting photosynthesis - Law of Limiting Factors -Plant Growth and Development - Phases of plant growth and plant growth rate - Condition fo Growth - Differentiation, dedifferentiation and redifferentiation - Sequence of developmental process in a plant cell - Growth regulators: auxin, gibberellin, cytokinin, ethylene, ABA - Photomorphogenesis including

brief account of phytochromes (Elementary Idea) - Seed germination - Seed dormancy - Vermalisation – Photoperiodism

UNIT III: HUMAN PHYSIOLOGY: Digestion and Absorption - Human alimentary canal and Digestive glands - Role of digesitive enzymes and gastrointestinal hormones - Peristalsis - Digestion, absorption and assimilation of proteins, carbodydrates and fats - Calorific value of proteins, carbodydrates and fats - Egestion - Nutritional and digestive disorders – P E M, indigestion, constipation, vomiting, jaundice Breathing and Respiration - Respiratory organts in animals (Recall only) - Respiratory system in humans - Mechanism of Breathing and its regulation in humans - Exchange of gases, transport of gases and regulation of respiration in humans - Respiratory volumes - 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 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, Osmoregulaion
- Regulation of kidney function, Renin-angiotensin, Antinatriuretic factor, ADH and Diabeters insipidus - Role of other organs in excretion - Disoders – 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. (to be dealt with the relvent practical of practical syllabus) - Joints - Disorders of muscular and skeletal systm – Myasthenia gravis, Tetany, Muscular dystrophy, Arthritis, Osteoporosis Gout

Unit IV: Neural control and coordination - Neural and nerves - Nervous system in humans - Central Nervous system, Peripheral Nervous system and Viseral Nervous system - Generation and conduction of nerve impulse - Reflex action - Sensory Perception - Elementary structure and function of eye and ear and general idea of other sense organs Chemical coordination and regulation - Endocrine glands and hormones - Human endocrine system – Hypothalamus, Pituitary, Pineal, Thyroid, Parathyroid, Adrenal, Pancreas, Gonads - Mechanism of hormone action (Elementary Idea) - Role of hormones as messengers and regulators - Hypo- and hyperactivity and related disorders, (Common disorders eg. Dwarfism, Acromegaly, Cretinism, goiter, exopthalmic goiter, diabetes, Addison's disease)

Unit V: GENETICS AND EVOLUTION

 Heredity and variation - Mendelian Inheritance - Deviations from Mendelism, incomplete dominance Co-dominance, Multiple alleles and Inheritance of blood group, pleiotropy.

- Elementary idea of Polygenic Inheritance - Chromosome theory of inheritance - Chromosomes and genes.
 Sex determination - In humans, birds, honey bee. - Linkage and crossing over. - Sex linked inheritance-Haemophilla, Colour blindness.
 Medellin disorders in humans - Chromosomal disorders in humans. - Down's syndrome, Turner's and klinefelter's syndromes.
 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. - Genome and human genome project. - DNA finger printing.

EVOLUTION

Origin of life ,Biological evolution and evidences for biological evolution (Paleontological from comparative anatomy and embryology and molecular evidence) - Darwin's contribution /Modern Synthetic theory of Evolution - Hardy – Weinberg's principle. Mechanism of evolution – Variation (Mutation & Recombination) and Natural Selection with examples drift types of natural slection - Gene flow and genetic - Adaptive Radiation Human evolution

Unit VI : **ECOLOGY AND ENVIRONMENT**

Meaning of ecology, environment, habitat and niche - Organisms and environment.
Population and ecological adaptations - Population Interactions – mutualism, competition, predation, parasitism. - Population attributes – growth, brith rate and death rate, - Age distribution.

Ecosystems

Patterns, components, energy flow, nutrient cycling (carbon and phosphorous), decomposition and producitivity - Pyramids of number, biomass, energy. - Ecological succession - Ecological Services: Carbon fixation, Pollination, Oxygen release

Biodiversity and its conservation - Threats to and need for biodiversity conservation. - Hotspots, endangered organisms, extinction, Red Data Book. - Biodiversity conservation-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.

Chemistry

Unit VII: Atomic Structure: Thomson's model, Rutherford's model, Bohr's model and their limitations. Concept of shells/subshells, dual nature of matter and light, de Broglie's relationship, Heisenberg uncertainty principle, concept of orbitals, Quantum numbers and their significance, shapes of orbitals. Aufbau principle, Pauli Exclusion Principle, Hund's rule, electronic configuration, stability of half filled and completely filled orbitals.

Periodic table: Classification of Elements, periodicity, modern periodic law. Periodic trends of elements -atomic radii, ionic radii. Ionization energy, electron affinity and electronegativity.

Chemical Bonding: Ionic bond, covalent bond: bond parameters. Lewis structures, polar character of covalent bond, covalent character of ionic bond, valence bond theory, geometry of

covalent molecules, VSEPR theory and hybridization. MOT of homo nuclear diatomic molecules, hydrogen bond.

Unit VIII: **Electrochemistry** - Redox reactions, conductance in electrolytic solutions, specific and molar conductivity variations 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.

Co-ordination compounds: Introduction, ligands, co-ordination number, colour, magnetic properties and shapes, IUPAC nomenclature. Bonding (Werner's theory, VBT and CFT); Structural and stereo isomerism, importance of co-ordination compounds (in qualitative inclusion of analysis, extraction of metals and biological systems).

Biomolecules: Carbohydrates-Classification and their importance, D-L configuration. Proteins: Elementary idea of α-amino acids and peptide bond. Polypeptides; proteins- primary, secondary and tertiary structure of proteins. Denaturation of proteins and enzymes. Lipids and hormones-classification and functions. Vitamins-Classification and functions. Nucleic Acids: DNA & RNA

Physics

Unit IX: Laws of Motion Intuitive concept of force. 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. Dynamics of uniform circular motion: Centripetal force, examples of circular motion (vehicle on level circular road, vehicle on banked road)

Work, Energy and Power Scalar product of vectors. 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: elastic and inelastic collisions in one and two dimensions.

Optics Ray Optics (Geometric Optics): Reflection of light, spherical mirrors, mirror formula. Refraction of light, total internal reflection and its applications, optical fibers, refraction at spherical surfaces, lenses, thin lens formula, lens-maker's formula. Newton's relation: Displacement method to find position of images (conjugate points) Magnification, power of a lens, combination of thinlenses 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. Elementary idea of Raman effect. Optical instruments: Human eye, image formation and accommodation, correction of eye defects (myopia, hypermetropia, presbyopia and astigmatism) using lenses. Microscopes and astronomical telescopes (reflecting and refracting) and their magnifying powers. Wave optics (Physical Optics): Wave front and Huygens principle, reflection and refraction of plane wave at

a plane surface using wave fronts. Proof of laws of reflection and refraction using Huygens, principle interference. Young's double slit
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. Polarization, plane polarized light; Brewster's law, uses of plane polarized light and polaroids.

Mathematics

Unit X: Straight Lines: Brief recall of 2D from earlier classes. Slope of a line and angle between two lines. Various forms of equations of a line: parallel to axes, point-slope form, slope-intercept form, twopoint form, intercepts form and normal form. General equation of a line. Distance of a point from a line.

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 wordsdifference between contradiction, converse and contrapositive.

STATISTICS & PROBABILITY 1. Statistics: Measure of dispersion; 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.