

GOVERNMENT OF KARNATAKA

KARNATAKA STATE PRE-UNIVERSITY EDUCATION EXAMINATION BOARD

**II YEAR PUC EXAMINATION –
MARCH 2012**

SCHEME OF EVALUATION

Subject Code: 36

Subject: Biology

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| Qn. No. | Value Points | Marks Alloted |
|---------|---|---------------------|
| | Note: Unlabelled, incorrect and wrongly labeled diagrams attract ZERO (0) Mark. | |
| | PART I – BOTANY | |
| | SECTION - A | |
| 1 | Name the enzyme produced by lac Z gene present in lac operon. | |
| | β -galactosidase / Beta galactosidase | 01 |
| 2 | Name the water conducting tissue in plants. | |
| | Xylem | 01 |
| 3 | Define osmosis. | |
| | Special type of diffusion which involves movement of water or solvent molecules through a semipermeable membrane from an area of its higher concentration to an area of its lower concentration OR Movement of water from a region of higher water potential to a region of lower water potential OR Movement of water from the region of its higher concentration to a region of its lower concentration across a selectively permeable membrane or a semipermeable membrane (any other relevant definition to be considered) | 01 |
| 4 | What is RQ value for carbohydrates? | |
| | 1(One)/unity | 01 |
| 5 | Give an example for naturally occurring Auxin. | |
| | Indole Acetic Acid / IAA | 01 |
| | SECTION – B | |
| 6 | Name the types of RNA. | |
| | Genetic RNA / Genomic RNA | (½ Mark) |
| | Non Genetic RNA / Non Genomic RNA – mRNA, rRNA, tRNA | (½ * 3 = 1 ½ Marks) |
| | (Mentioning only genetic and non genetic RNA carries -½ mark each) | |
| 7 | List any four applications of DNA fingerprinting . | |
| | I. Forensic investigations for detection of criminals, rapists, murderers etc. II. Solving disputed parentage cases. III. Identification of victims of natural disasters. | 02 |

Subject Code: 36

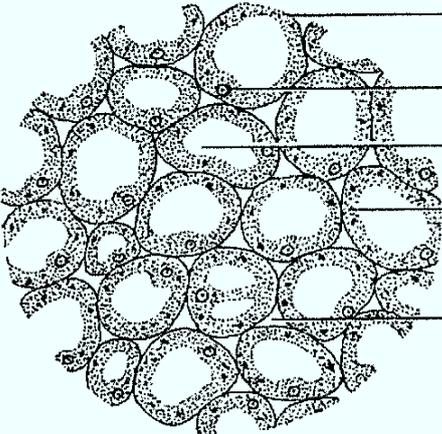
Subject: Biology

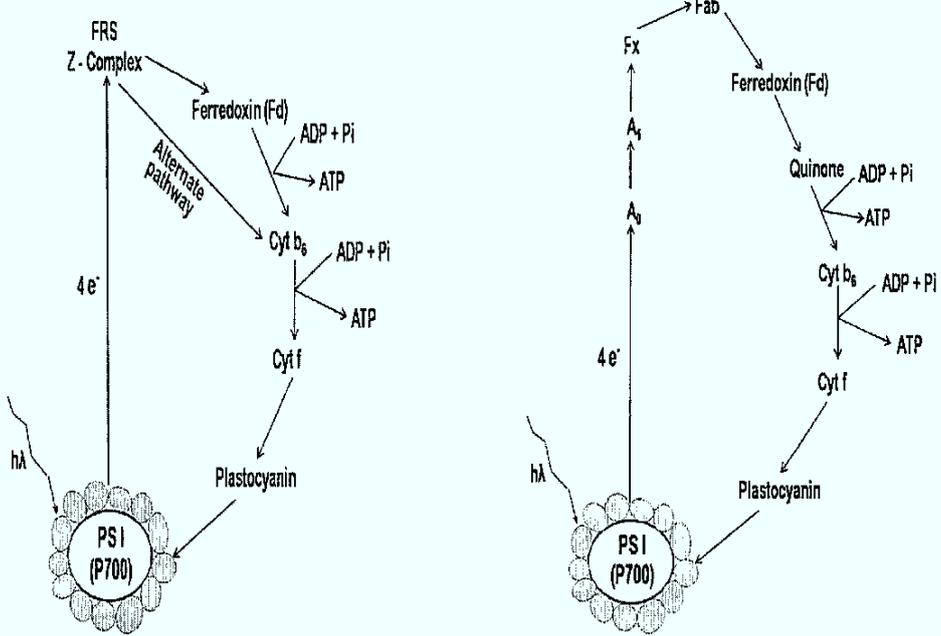
March - 2012

| | <p>IV. Solving issues related to reunion of lost children with their parents</p> <p>V. Solving baby switch over cases in hospitals</p> <p>VI. Studying gene mutations and its effects</p> <p>VII. Determining evolutionary relationships between races</p> <p>VIII. Solving immigration and emigration disputes</p> <p>IX. Tracking of animal movement</p> <p>X. Determination of suitability of bone marrow or other tissues for organ transplantation surgeries to avoid rejection of grafts.</p> <p>XI. Identification of plants for patents</p> <p style="text-align: center;">(Listing any four applications ½ mark each * 4 = 2)</p> | | | | | | | | | |
|---|--|-----------|------------|---|---|----|----|--|--|-----------|
| 8 | Differentiate between Phellem and Phelloderm | | | | | | | | | |
| | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;">Phellem</th> <th style="width: 50%; text-align: center;">Phelloderm</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">Secondary tissue formed towards the outer side by Cork Cambium consisting of dead cells</td> <td style="padding: 5px;">Secondary tissue formed towards the inner side by Cork Cambium consisting of living cells</td> </tr> <tr> <td style="text-align: center; padding: 5px;">OR</td> <td style="text-align: center; padding: 5px;">OR</td> </tr> <tr> <td style="padding: 5px;">Secondary tissue in the periderm found outer to the Cork Cambium</td> <td style="padding: 5px;">Secondary tissue in the periderm found inner to the Cork Cambium</td> </tr> </tbody> </table> | Phellem | Phelloderm | Secondary tissue formed towards the outer side by Cork Cambium consisting of dead cells | Secondary tissue formed towards the inner side by Cork Cambium consisting of living cells | OR | OR | Secondary tissue in the periderm found outer to the Cork Cambium | Secondary tissue in the periderm found inner to the Cork Cambium | 02 |
| Phellem | Phelloderm | | | | | | | | | |
| Secondary tissue formed towards the outer side by Cork Cambium consisting of dead cells | Secondary tissue formed towards the inner side by Cork Cambium consisting of living cells | | | | | | | | | |
| OR | OR | | | | | | | | | |
| Secondary tissue in the periderm found outer to the Cork Cambium | Secondary tissue in the periderm found inner to the Cork Cambium | | | | | | | | | |
| 9 | Draw a labeled diagram of hydathode. | | | | | | | | | |
| | <p style="text-align: center;">(Neat diagram with four any 4 correct labeling- ½ mark each * 4 = 2)</p> | 02 | | | | | | | | |
| 10 | What is bolting? Name the phytohormone responsible for this. | | | | | | | | | |
| | <p>Elongation of the internodes</p> <p>OR</p> <p>Elongation of the stem</p> <p>OR</p> <p>Growth of long stem with sparse leave in rosette plants</p> <p style="text-align: right;">(Any one of the above – 1 Mark)</p> <p>Gibberellin / Gibberellic Acid / GA</p> <p style="text-align: right;">(Any one name – 1 Mark)</p> | 02 | | | | | | | | |

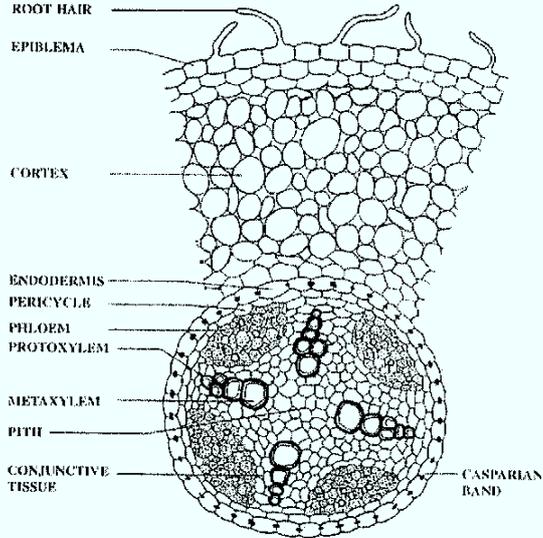
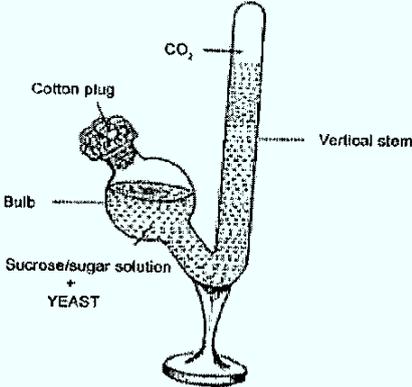
| | | |
|--------------------|---|----|
| 11 | Define growth. Mention two regions of growth. | |
| | <p>Definition: Irreversible or permanent increase in the size of an organism accompanied by increase in dry weight (1 Mark)</p> <p>Regions</p> <ol style="list-style-type: none"> i. Region of cell division / cell multiplication / cell formation ii. Region of cell elongation iii. Region of cell maturation or cell differentiation <p>(Mentioning any two regions – ½ mark each * 2 = 1 Mark)</p> | 02 |
| SECTION – C | | |
| 12 | What is genetic code? Explain any four of its characteristic features. | |
| | <p>The message present on the DNA(Antisense strand) or mRNA in coded form for the synthesis of proteins</p> <p>OR</p> <p>Sequences of three nucleotides on DNA or mRNA coding for a specific amino acids for protein synthesis (1 Mark)</p> <p>Features: Genetic code is</p> <ol style="list-style-type: none"> i. Universal – A codon specifies or recognizes the same amino acids in all organisms. ii. Triplet – Each codon consists of sequence of three nitrogenous bases. iii. Sensible – Each codon codes for a particular amino acid in all organisms. Eg.: AUG codes for methionine. iv. Non overlapping – Adjacent codons are independent, with the same nitrogenous bases not being the member of two codons. v. Degenerate or Redundant – Most of the amino acids are coded by more than one codon. Eg: Valine – GUU, GUC, GUA, and GUG. vi. Commaless or punctuation less – It reads continuously without any pauses or punctuation marks. vii. Initiator codon or start signal – The first codon in mRNA is AUG (GUG in the absence of AUG) which initiates protein synthesis. viii. Terminator codon or stop signal or nonsense codon – Three codons UAA, UAG, UGA do not code for any amino acid and stops or terminates polypeptide synthesis. ix. Colinear– The linear order of nucleotides in DNA determine the linear order of amino acids in a polypeptide chain. <p>(Any four features with correct explanation 1 mark each * 4 = 4Marks) (Only mentioning or listing of any four features ½ marks each * 4 = 2Marks)</p> | 5 |

| | | |
|----|---|----|
| 13 | <p>Explain the structure of p^{UC18} with a labeled sketch.</p> <div data-bbox="558 201 989 649" style="text-align: center;"> </div> <p>Description:</p> <ol style="list-style-type: none"> i. Reconstructed plasmid of E- coli (½ Mark) ii. Without fertility factor (F) (½ Mark) iii. Made up of 2686 base pairs or 2.68 Kb (½ Mark) iv. Has Amp^r gene or Ampicillin Resistance Gene ORI gene and αlac Z gene (½ Mark) v. Has a small segment of DNA with about 60base pairs in the region of α lac Z gene called Multiple Cloning Site or MCS (½ Mark) vi. Multiple cloning site has 10-15 recognition sites or cleavage sites or restriction sites where the foreign DNA is inserted (½ Mark) <p style="text-align: right;">(Diagram with correct labeling – 2 Marks) (Description – 3 Marks)</p> | 05 |
| 14 | <p>Describe the steps in monoclonal antibody production.</p> <p>Monoclonal antibody production:</p> <ol style="list-style-type: none"> 1. Immunisation: A rabbit or mouse is immunized by repeated injection of a <u>specific antigen</u> so that the desired <u>B cells proliferate</u> producing specific antibodies (1 Mark) 2. Tumour induction: Tumour is induced in rabbit or mouse and <u>myeloma cells</u> are isolated from their bone marrow (1 Mark) 3. Culture of B lymphocytes and myeloma cells: The B lymphocytes from the <u>spleen of immunized rabbit or mouse are collected and cultured.</u> (1 Mark) 4. Production of hybridoma: Antibody producing cells or B cells are mixed with myeloma cells and are made to fuse <u>in vitro</u> in the presence of <u>polyethelene glycol (PEG) in HAT medium (Hypoxanthine Aminopterin Thymidine medium)</u> to get <u>hybridomas</u> (1 Mark) 5. Selection of hybridoma cells: Select the desired hybridoma for cloning and antibody production. Only one on several hundred cell hybrids will produce antibodies of the desired specificity (½ Mark) 6. Production of antibodies from hybridoma : Culture the selected hybridoma cells to get antibodies which are later isolated and purified (½ Mark) <p style="text-align: right;">(Only schematic representation of the steps – 02 Marks)</p> | 05 |

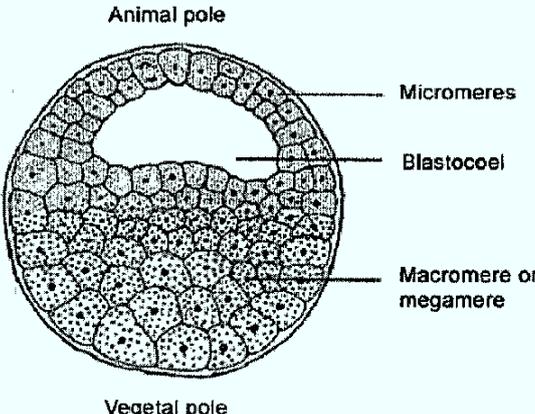
| | | |
|----|--|----|
| 15 | With a labeled diagram explain the structure of Parenchyma tissue. Mention any two functions of it. | |
| | <div style="text-align: right;">  <p>CELL WALL NUCLEUS VACUOLE CYTOPLASM INTERCELLULAR SPACE</p> </div> <p style="text-align: center;">(Neat diagram with four correct labeling ½ Mark each * 4 = 2 Marks)</p> <p>Description:</p> <ol style="list-style-type: none"> i. Cells are spherical, oval or isodiametric ii. Loosely arranged with intercellular spaces iii. Cells are thin walled, cell wall made up of cellulose iv. Cytoplasm – Dense and vacuolated v. Uninucleated, nucleus located at the periphery <p style="text-align: right;">(2 Marks)</p> <p>Functions:</p> <ol style="list-style-type: none"> i. Provides rigidity ii. Packaging tissue iii. Photosynthesis iv. Storage v. Buoyancy <p style="text-align: right;">(Any two functions – ½ Mark each * 2 = 1 Mark)</p> | 05 |
| 16 | What is transpiration? List two advantages and two disadvantages of it. | |
| | <p>Loss of water in the form of vapour through the aerial parts of the plant body (1 Mark)</p> <p>Advantages:</p> <ol style="list-style-type: none"> i. Cooling effect on plant body and surroundings ii. Prevents water logging iii. Maintains turgidity iv. Creates suction force or transpiration pull which is responsible for ascent of sap v. Maintains constant temperature within the plant body necessary for enzyme action <p style="text-align: right;">(Any two advantages – 1 Mark each * 2 = 2 Marks)</p> <p>Disadvantages:</p> <ol style="list-style-type: none"> i. Excess transpiration leads to wilting and death. ii. Continuous transpiration results in increase in the temperature within the plant | 05 |

| | | |
|-----------|--|-----------|
| | <p>iii. Leads to wastage of energy iv. Causes closure of stomata which affects gaseous exchange and photosynthesis</p> <p style="text-align: center;">(Any two disadvantages – 1 Mark each * 2 = 2 Marks)</p> | |
| 17 | Explain cyclic photophosphorylation with a schematic representation | 05 |
| | <div style="display: flex; justify-content: space-around; align-items: center;">  </div> <p>Description:</p> <ol style="list-style-type: none"> The process of formation of ATP from ADP by the cyclic transfer of energy rich electrons through a series of electron carriers during light reaction is called cyclic photo phosphorylation (½ Mark) This involves only PS1, chlorophyll a 700 absorbs light energy, gets excited emitting energy rich electrons (½ Mark) These electrons are accepted by a primary electron acceptor FRS (½ Mark) The electrons are cycled back to PS1 through electron carriers like Fd, cyt b₆, cytf and PC (plastocyanin) (½ Mark) Electrons may be transferred from FRS to cyt b₆ which is an alternate pathway (½ Mark) Two molecules of ATP are formed (½ Mark) <p style="text-align: right;">(Correct schematic representation any one of the above or any other relevant and correct scheme– 2 Marks) Description – 3 Marks)</p> | |

| SECTION – D | | |
|-------------|---|-----------|
| i. | | |
| 18 | <p>State Blackmann’s law of limiting factors. Explain any four external factors affecting respiration.</p> <p>Statement: When a process is conditioned as to its rapidity by a number of separate factors, the rate of the process is limited by the pace of the slowest factor (1 Mark)</p> <p>Factors:</p> <ol style="list-style-type: none"> i. Light: This effects respiration indirectly. Rate of respiration increases with the increase in the intensity of light as the respiratory substrates (carbohydrates) are synthesised in the presence of sunlight (photorespiration) (1 Mark) ii. CO₂: Increased level of CO₂ decreases the rate of respiration. Accumulation of CO₂ in the cell decreases the pH and thus affects enzyme activity. Increased CO₂ in the environment results in a higher rate of photosynthesis than respiration (1 Mark) iii. Oxygen: Since oxygen is one of the raw materials, its concentration determines whether respiration should be aerobic or anaerobic. When it decreases considerably the cells and tissues switch over to anaerobic respiration (1 Mark) iv. Water: Increased water supply increases the rate of respiration to a certain extent (1 Mark) v. Temperature: Temperature determines the activity of enzymes and therefore any change in temperature alters the rate of respiration(30°C is considered as the optimum temperature for respiration) (1 Mark) <p style="text-align: center;">(Any four factors with explanation 1 Mark each * 4 = 4 Marks) (Only listing of the factors without explanation ½ Mark each * 4 = 2 Marks)</p> | 05 |
| 19 | <p>Give reasons for the following:</p> <ol style="list-style-type: none"> a) Nucleotide ratio in RNA is highly variable <ul style="list-style-type: none"> ➤ It is single stranded / there is no complimentary base pairing (1 Mark) b) DNA replication is semi-conservative <ul style="list-style-type: none"> ➤ One of the daughter strands is parental and the other one is newly synthesized OR one of the parental strands is conserved in the newly formed DNA molecule (1 Mark) c) In open field, plants show high rate of transpiration <ul style="list-style-type: none"> ➤ In an open field, humidity or water vapour in the environment is less OR moderate wind velocity carries or blows away vapour from the leaf surface (1 Mark) d) Overmanuring without water results in wilting and death of plant <ul style="list-style-type: none"> ➤ Soil solution becomes hypertonic resulting in the exosmosis of water from root cells (1 Mark) e) Yeast cells consume less glucose molecules in the presence of oxygen <ul style="list-style-type: none"> ➤ They exhibit aerobic respiration (1 Mark) | 05 |

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| II. | | |
| 20 | Draw a neat labeled diagram of T. S. of young dicot root (enlarged portion) | |
| |  <p style="text-align: center;">(Neat and correct diagram – 1 Mark) (Any 8 correct labellings – ½ Mark * 8 = 4 Marks) (If the diagram shows up to 6 patches of xylem and phloem in the stele, marks to be awarded)</p> | 05 |
| 21 | Explain Kuhne's fermentation experiment with a labeled diagram | |
| |  <p>Aim: To demonstrate fermentation</p> <p>Principle: Yeast produces <u>invertase</u> and <u>zymase</u> enzymes which carries out <u>fermentation of glucose into Ethyl alcohol and CO₂</u>. <u>Invertase converts sucrose into glucose & fructose and zymase converts glucose into ethyl alcohol and CO₂</u>. Two molecules of ATP are generated</p> <p>Glucose $\xrightarrow{\text{Zymase}}$ Ethyl alcohol + CO₂ + 2ATP</p> <p>Requirements: Kuhne's flask, 10% sucrose solution, yeast, KOH pellets, non absorbent cotton.</p> <p>Procedure: Kunhe's flask is filled with 10% sucrose solution in such a way that the vertical tube is completely filled and bulb of the flask is half filled. A pinch of yeast is added to the solution. The bulb is closed with a non-absorbent cotton plug. The</p> | 05 |

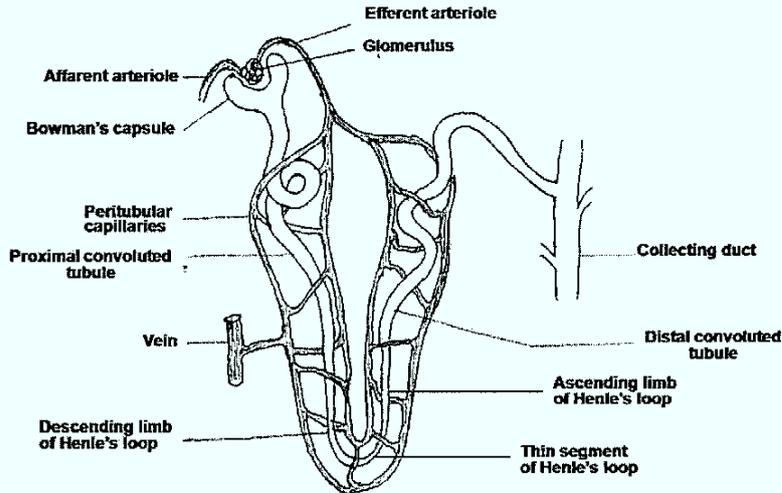
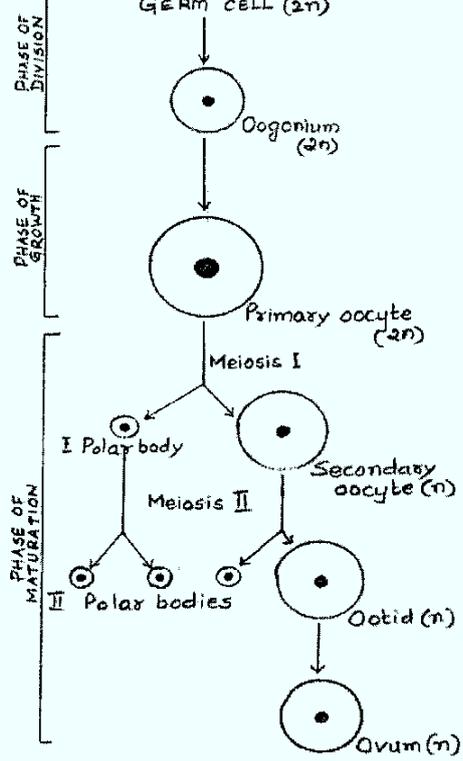
| | | |
|--------------------------|---|----------------------|
| | <p>experimental set up is kept undisturbed in a warm place for few hours and observed.</p> <p>Observation: A gas would have displaced sucrose solution in the vertical stem of the flask. When KOH pellets are introduced into the flask, the level of the sucrose solution rises in the vertical stem.</p> <p>Inference: This confirms the evolution of CO₂ during fermentation.</p> <p>(Diagram with four correct labelings – ½ Mark each * 4 = 2 Marks Description - aim + principle – 1 Mark Requirements – ½ Mark Procedure – ½ Mark Observation – ½ Mark Inference – ½ Mark = 3 Marks)</p> | |
| PART II – ZOOLOGY | | |
| SECTION – E | | |
| 22 | Write the chromosomal complement of Klinefelter's syndrome. | |
| | 44A + XXY | 01 |
| 23 | What are sacred groves? | |
| | Traditionally conserved or protected small patches of land with few trees or dense forest covering, that is dedicated to a local deity OR Patches of natural or near natural vegetation dedicated by local communities to their ancestral spirits or deities out of reverence and respect or fear and sentiments | 01 |
| 24 | Name the hyperglycemic factor secreted by pancreas. | |
| | Glucagon | 01 |
| 25 | What are interferons? | |
| | Antiviral proteins produced by virus infected cells | 01 |
| 26 | Name the band of nerve fibres connecting cerebral hemispheres. | |
| | Corpus callosum | 01 |
| SECTION – F | | |
| 27 | Write the genotypes of blood group A and blood group B. | |
| | Blood group A – I ^A I ^A & I ^A I ⁰ (I ^A i) OR L ^A L ^A & L ^A L ⁰ Blood group B – I ^B I ^B & I ^B I ⁰ (I ^B i) OR L ^B L ^B & L ^B L ⁰ | (1 Mark) (1 Mark) |
| 28 | What is biodiversity? Mention any two types of biodiversity. | |
| | Variety and variability of all life forms on earth OR Sum total of species richness in a particular habitat OR Sum of different types of genes, gene pools, species, habitats and ecosystems in a particular place (1 Mark) Types: i. Genetic diversity ii. Species diversity iii. Habitat or ecosystem diversity (Any two types ½ Mark each * 2 = 1 Mark) | 02 |

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| 29 | <p>What is acid rain? Mention any two effects of acid rain on human health.</p> <p>Acid rain refers to the rainfall and other forms of precipitation with a pH of less than 5. (1 Mark)</p> <p>Effects:</p> <ol style="list-style-type: none"> Respiratory disorders Nervous disorders Skin disorders Cardiac problems Digestive problems <p>(Any two ½ Mark * 2 = 1 Mark)</p> | 02 |
| 30 | <p>What are analgesics? Give two examples.</p> <p>Drugs that reduce or relieve pain by suppressing the activity of central nervous system(CNS) (1 Mark)</p> <p>Eg.: Opium(brown sugar), heroin, codeine, morphine, pethedine, methadone, mephedrine, thebaine, papaverine, oxycodone, propoxyphene, hydromorphine, diphenoxylate, pentazocine etc. (Any two * ½ Mark = 1 Mark)</p> | 02 |
| 31 | <p>Draw a labeled diagram of V. S. of blastula</p> <div style="text-align: center;">  </div> <p>(Neat diagram with four correct labeling ½ Mark each * 4 = 2 Marks)</p> | 02 |
| 32 | <p>What is conception? Name two assisted conception methods.</p> <p>Conception is fertilization and subsequent implantation of the zygote OR Ability of female to conceive or to become pregnant or establishment of pregnancy (1 Mark)</p> <p>Assisted conception methods:</p> <ol style="list-style-type: none"> IVF-ET (InVitro Fertilization – Embryo Transfer) ZIFT (Zygote Intra Fallopian Transfer) GIFT (Gamete Intra Fallopian Transfer) POST (Peritoneal Oocyte & sperm transfer) <p>(Any two ½ Mark each * 2 = 1 Mark)</p> | 02 |

| SECTION – G | | | | | | | | | | | |
|--------------------|--|-------------|-----|-----|-----|-----------|------------|-----|------------|-------------|-----------|
| 33 | What is incomplete dominance? Explain inheritance of flower colour in <i>Mirabilis jalapa</i>. | | | | | | | | | | |
| | <p>Inability of a dominant gene to express completely over a recessive gene OR Inability of a dominant gene to mask the expression of a recessive gene completely OR The expression of an intermediate character in a cross involving two pure breeding varieties, differing in a pair of contrasting characters (1 Mark)</p> <p>Explanation:</p> <p>Parents (phenotype) Pure Red x Pure White Genotype RR rr Gametes (R) (r) (½ Mark)</p> <p>F₁ generation Rr (All pink) Selfing F₁ Pink x F₁ Pink Genotype Rr Rr Gametes (R) (r) (R) (r) (½ Mark)</p> <p>F₂ generation (½ Mark)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td style="text-align: center;">(R)</td> <td style="text-align: center;">(r)</td> </tr> <tr> <td style="text-align: center;">(R)</td> <td style="text-align: center;">RR Red</td> <td style="text-align: center;">Rr Pink</td> </tr> <tr> <td style="text-align: center;">(r)</td> <td style="text-align: center;">Rr Pink</td> <td style="text-align: center;">rr White</td> </tr> </table> <p>Phenotypic ratio – Red : Pink : White – 1 : 2 : 1 Genotypic ratio – RR : Rr : rr :: 1 : 2 : 1 (any one ratio ½ Mark)</p> <p>Explanation:</p> <p>True breeding plant of <i>Mirabilis Jalapa</i> or 4 o'clock plant producing red flowers was crossed with a true breeding plant producing white flowers.</p> <p>Offsprings in the F₁ generation obtained produced pink flowers (intermediate character) suggesting incomplete dominance. (1 Mark)</p> <p>When F₁ plants are selfed in the F₂ generation plants producing red, pink and white flowers appeared in 1:2:1 ratio.</p> <p>The reappearance of red and white flowers in the F₂ generation suggests that the alleles for red and white colours have not mixed but segregated into different gametes. (1 Mark)</p> <p style="text-align: right;">(Schematic representation with ratios – 2 Marks Explanation – 2 Marks)</p> | | (R) | (r) | (R) | RR Red | Rr Pink | (r) | Rr Pink | rr White | 05 |
| | (R) | (r) | | | | | | | | | |
| (R) | RR Red | Rr Pink | | | | | | | | | |
| (r) | Rr Pink | rr White | | | | | | | | | |

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| 34 | What is biodiversity depletion? Explain the impact of deforestation and loss of soil fertility on biodiversity. | |
| | <p>Biodiversity depletion: The reduction in the number of life forms</p> <p style="text-align: center;">OR</p> <p style="text-align: center;">Loss of life forms (1 Mark)</p> <p>Impact of deforestation: Destroys natural habitats, Depletes animal diversity Reduces moisture content & organic debris in soil leading to loss of soil fertility, desertification, affects water cycle, leads to drought, global warming, deprives of forest products like fruits, honey, mushroom, raisins, wax, animal products, Threat to wild life (2 Marks)</p> <p>Impact of loss of soil fertility Decreases number of plants by reducing essential nutrients for growth, shortage of food and shelter for animals, loss of vegetation, change in weather pattern, loss of microbial flora and fauna, soil erosion (2 Marks)</p> | 05 |
| 35. | Explain carbohydrate and fat digestion in small intestine. | |
| | <p style="text-align: center;"><u>Carbohydrate digestion:</u></p> <ul style="list-style-type: none"> • Pancreatic amylase (amyllopsin) of the pancreatic juice catalyses the conversion of polysaccharides like starch and glycogen into maltose and dextrins (1 Mark) • Sucrase(Invertase) catalyses the conversion of sucrose into glucose and fructose (1 mark) • Lactase catalyses the conversion of lactose into glucose and galactose (1 Mark) • Maltase catalyses the conversion of maltose into glucose molecules (1 Mark) <p style="text-align: center;"><u>Fat digestion:</u></p> <ul style="list-style-type: none"> • Pancreatic lipase (steapsin) catalyses the conversion of emulsified fats into fatty acids and glycerol • Intestinal lipase catalyses the conversion of emulsified fats into fatty acids and glycerol (Any one – 1 Mark) <p style="text-align: center;">Role of any five enzymes (Equations with enzymes or representation in the tabular form to be considered Equations without enzymes carry zero [0] Marks)</p> | 05 |

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| 36. | What is breathing? Explain the mechanism of breathing. | |
| | <p>Breathing is exchange of air between the atmosphere and lungs</p> <p style="text-align: center;">OR</p> <p>Breathing is a mechanical process that involves inhalation(inspiration) and exhalation(expiration) of air. (1 Mark)</p> <p>Mechanism:</p> <p>Inspiration:</p> <ul style="list-style-type: none"> i. The <u>external intercostal muscles</u> contract resulting in the upward and outward movement of ribs (½ Mark) ii. Simultaneously the <u>radial and circular muscles of the diaphragm</u> (phrenic muscles) contract that makes the <u>dome shaped diaphragm flat</u> (½ Mark) iii. <u>Volume of the chest cavity increases, interpleural pressure decreases, spongy lungs expands and therefore air from the atmosphere enter into the lungs</u> (1 Mark) <p>Expiration:</p> <ul style="list-style-type: none"> i. <u>External intercostal muscles relax</u> resulting in the <u>inward and downward movement of ribs</u> (½ Mark) ii. The <u>radial & circular muscles of diaphragm (phrenic muscles) relax</u>, flat diaphragm becomes <u>dome shaped</u> (½ Mark) iii. <u>Volume of the chest cavity decreases, interpleural pressure increases, spongy lungs contract, interpulmonary pressure increases, air from the lungs comes out</u> (1 Mark) | 05 |

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| 37. | <p>Draw a neat labeled diagram of Nephron.</p> | 05 |
| |  <p>(Neat and correct diagram with or without peritubular capillaries – 1 Mark Any eight parts correctly labeled – ½ Mark each* 8 = 4 Marks)</p> | |
| 38. | <p>Explain Oogenesis with a schematic representation</p> | 05 |
| |  <p>(correct schematic representation – 2 Marks)</p> | |

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| | <p>Explanation:</p> <ul style="list-style-type: none"> i. Multiplication phase: The germinal epithelium lining the ovary divide mitotically to produce oogonia(2n) (½ Mark) ii. Growth phase: This is a prominent phase. The oogonia gradually grow and increase in size. This is called primary oocyte Events in growth phase: <ul style="list-style-type: none"> a. Previtellogenesis – Characterised by increase in the volume of nucleus and cytoplasm of primary oocyte. Vitellogenesis – Involves the synthesis of yolk or vitelline or deuteroplasm in the oogonia (1 Mark) b. Synthesis of cell organells and pigment granules (½ Mark) iii. Maturation phase – Primary oocyte undergoes <u>meiosis I (reduction)</u> which is unequal resulting in one secondary oocyte and one polar body. Secondary oocyte undergoes <u>meiosis II</u> which is also unequal resulting in a large ootid and small secondary polar bodies (1 Mark) <p style="text-align: right;">(Description of the process – 3 Marks) (only mentioning the phases ½ mark each *3=1 ½ Marks)</p> | |
| SECTION – H | | |
| I. | | |
| 39. | Draw a neat labeled diagram of V. S. of human heart. | |
| | <div style="text-align: center;"> </div> <p style="text-align: right;">05</p> <p style="text-align: right;">(Neat and correct diagram – 1 Mark Any eight correct labeling ½ Mark each * 8 = 4 Marks)</p> | |

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| 40. | <p>Give reasons for the following:</p> <p>a. People with blood group 'O' are called universal donors ➤ Antigens are absent on the RBC membrane and hence can donate blood to people of any blood group (1 Mark)</p> <p>b. Lion tailed Macaque is an endemic species of Western Ghats ➤ Restricted to western ghats (1 Mark)</p> <p>c. The injury to cerebrum can lead to the loss of muscular movement ➤ The cerebrum has motor areas that control the movement of voluntary muscles (1 Mark)</p> <p>d. Oxytocin is called birth hormone ➤ Promotes labour or induces violent uterine muscle contractions leading to parturition (1 Mark)</p> <p>e. Pituitary is a master gland ➤ It secretes several hormones which controls the activities of other endocrine glands (1 Mark)</p> | 05 |
| 1. | | |
| 41. | a. Draw a neat labeled diagram of T. S. of mammalian testis | |
| | <p style="text-align: center;">(Neat and correct diagram – 1 Mark Any six correct labellings ½ Mark each * 6 = 3 Marks)</p> | 05 |
| | b. What is the significance of Biuret test? | |
| | Helps in detecting the presence or absence of protein or albumin in a given sample (1 Mark) | |

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| I. | | |
| 42. | a. Draw a neat labeled diagram of Areolar connective tissue. | |
| | <p style="text-align: center;">Mast cell</p> <p style="text-align: right;">Fibroblast Elastin fibre Amorphous ground substance (MATRIX) fat cell Plasma cell Macrophage Collagen fibres</p> <p style="text-align: right;">(Neat and correct diagram – 1 Mark Any six correct labellings ½ Mark each * 6 = 3 Marks)</p> | 05 |
| | b. Name the membrane covering the hyaline cartilage. | |
| | Perichondrium | (1 Mark) |