

BIOLOGY (044) CLASS XI SAMPLE PAPER**Marking Scheme**

(Marking scheme and Hints to solution)

Note: (Any other relevant answer not given here in but given by the candidate be also suitably awarded)

Q.No.	Value Points / Key points	Marks allotted to each value point/key point	Total marks
1	c) They show living characteristics only inside a host cell.	1	1
2	c) 30	1	1
3	c) ADH (Anti-Diuretic Hormone / Vasopressin)	1	1
4	c) Synovial fluid	1	1
5	c)	1	1
6	b) ii, iii and iv	1	1
7	d) The side chain (R group)	1	1
8	c) Spindle microtubule arrangement / attachment	1	1
9	c) 2, 1, 3	1	1
10	a) More permeable to K^+ than to Na^+	1	1
11	b) Fats	1	1
12	a) I-b, II-c, III-a, IV-d	1	1
13	a) Both Assertion and Reason are true, and Reason is the correct explanation of Assertion.	1	1
14	a) Both Assertion and Reason are true, and Reason is the correct explanation of Assertion.	1	1
15	c) Assertion is true, but Reason is false.	1	1
16	b) Both Assertion and Reason are true but Reason is the not the correct explanation of Assertion.	1	1

17	Gametophytic Phase vs. Sporophytic Phase in Funaria: 1. Ploidy: Gametophyte is haploid (n), while Sporophyte is diploid (2n). 2. Nutritional Dependence: Gametophyte is independent, photosynthetic, and dominant. The sporophyte is partially or completely dependent on the gametophyte for anchorage and nutrition (water & minerals).	0.5 mark 0.5 mark 0.5 mark 0.5 mark	2
18	Calculations of Growth Rates: 1. Absolute Growth Rate (AGR) = Final area - Initial area • Leaf A: $AGR = 20 \text{ cm}^2 - 15 \text{ cm}^2 = 5 \text{ cm}^2/\text{week}$ • Leaf B: $AGR = 55 \text{ cm}^2 - 50 \text{ cm}^2 = 5 \text{ cm}^2/\text{week}$ Conclusion: Both leaves have equal Absolute Growth Rate ($5 \text{ cm}^2/\text{week}$). 2. Relative Growth Rate (RGR) = (Absolute growth / Initial area) $\times 100$ • Leaf A: $RGR = (5 / 15) \times 100 = 33.33\%$ • Leaf B: $RGR = (5 / 50) \times 100 = 10\%$ Conclusion: Leaf A shows a higher Relative Growth Rate than Leaf B.	0.5 mark 0.5 mark 0.5 mark 0.5 mark	2
19	a) In a chemical synapse, the nerve impulse reaching the presynaptic axon terminal normally triggers the release of neurotransmitters into the synaptic cleft. If neurotransmitter release is blocked, the neurotransmitter cannot bind to receptors on the postsynaptic membrane. Therefore, the next neuron does not generate a new impulse. b) No. Electrical synapses transmit impulses directly through gap junctions between adjacent neurons. They do not depend on the release of neurotransmitters, so blocking neurotransmitter release would not affect transmission in the same way. OR a) Effect on Blood Pressure: Angiotensin II is a powerful vasoconstrictor. Blocking its formation causes vasodilation, resulting in a decrease in blood pressure. b) Effect on Aldosterone Secretion: Angiotensin II stimulates adrenal cortex to secrete aldosterone. Blocking it will inhibit/decrease aldosterone secretion, reducing Na^+ and water reabsorption in distal tubules.	1 mark 0.5 + 0.5 mark OR 1 mark 1 mark	2
20	(i) Anaphase of Mitosis vs. Anaphase I of Meiosis:		

	• Mitotic Anaphase: Centromeres split and sister chromatids separate to opposite poles. • Anaphase I: Homologous chromosomes separate to opposite poles while sister chromatids remain associated at their centromeres. (ii) Zygotene vs. Pachytene: • Zygotene: Pairing of homologous chromosomes (synapsis) occurs with formation of synaptonemal complex / bivalents. • Pachytene: Crossing over (exchange of genetic material) occurs between non-sister chromatids mediated by recombinase enzyme.	0.5 mark 0.5 mark 0.5 mark 0.5 mark	2
21	a) Morphine: Alkaloids b) Concanavalin A: Lectins c) Anthocyanin: Pigments d) Curcumin: Drugs	0.5 mark 0.5 mark 0.5 mark 0.5 mark	2
22	a) Malaria: Caused by Plasmodium (P. vivax, P. falciparum). Kingdom: Protista. b) Sleeping sickness: Caused by Trypanosoma gambiense. Kingdom: Protista. c) Rust of wheat: Caused by Puccinia graminis. Kingdom: Fungi.	0.5 + 0.5 mark 0.5 + 0.5 mark 0.5 + 0.5 mark	3
23	Pg 81, Fig 7.2 NCERT book	1 mark (diag.) 0.5 X 4 = 2 (any 4 labels)	3
24	Centriole vs. Cilium Microtubular Arrangement: a) Microtubular Notation & Arrangement: • Centriole: 9 + 0 arrangement (9 peripheral triplet fibrils of tubulin without central microtubules). • Cilium: 9 + 2 arrangement (9 peripheral doublet microtubules and 2 central singlet microtubules connected by bridge/sheath). b) Primary Globular Protein: • Tubulin protein.	1 mark 1 mark 1 mark	3
25	Muscle Contraction Dynamics (Sliding Filament Theory): (a) Muscle Fibre B will fail to initiate contraction. Reason: Calcium ions bind to troponin on actin filaments, removing the masking of active sites for myosin. Without Ca ²⁺ release, active sites remain blocked.	1 mark	

	Muscidae (Family) -> Diptera (Order) -> Insecta (Class) -> Arthropoda (Phylum) 2. Scientific Name: <i>Musca domestica</i> (Housefly)	2 marks (0.5 x 4) 1 mark	3
29	a) Identification: Hormone is Thymosin; Source gland is Thymus Gland. OR b) Biochemical Nature: Peptide/Protein hormone; Receptors located on Cell Membrane (Extracellular surface). c) Pattern Analysis: Thymosin level peaks during childhood/puberty (~15-20 yrs) and undergoes progressive decline/degeneration with advancing adult age. d) Reason & Health Impact: Thymus gland undergoes age-related atrophy/degeneration. As a result, thymosin production decreases, leading to decreased T-cell differentiation, weakening cell-mediated and humoral immunity in old age.	1+ 1 mark Or 1+ 1 mark 1 mark 1 mark	4
30	a) Dicot Root. Justifications: Presence of unicellular root hairs, radial vascular bundles, and exarch xylem (protoxylem towards periphery, metaxylem towards center). (any one) b) Plant Example: Sunflower (<i>Helianthus annuus</i>) / Bean / Pea root. c) Layer X is Endodermis. Feature: Presence of Casparian strips (suberin deposition) on radial and tangential walls, making it impermeable to water and forcing symplastic transport. OR Protoxylem & Metaxylem Arrangement: Protoxylem lies towards outside/periphery and metaxylem towards centre. This condition is known as Exarch.	0.5 mark 0.5 mark 1 mark 1 mark 1 mark OR 1 + 1 mark	4
31	a) (i) Phylum A: Ctenophora / Coelenterata (Cnidaria); Phylum E: Arthropoda. (ii) Specimen B: Excretory tube; Specimen C: Flame cells (iii) Specimen D: Water vascular system OR a) Sequence of Events in Fungal Sexual Reproduction: 1. Plasmogamy: Fusion of protoplasts between two motile or non-motile gametes. 2. Karyogamy: Fusion of two haploid nuclei forming a diploid zygote.	1+ 1 marks 1+1 marks 1 mark OR 3 marks (1x3)	

	3. Meiosis: Zygote undergoes reductional division leading to haploid sexual spores (e.g. ascospores, basidiospores). b) Reasons: (i) Protista as Link: Unicellular like moneran but with more advanced level of organisation. (Well-developed nucleus/ membrane bound organelles) Eukaryotic and saprophytic/ produce spores like Fungi. (ii) Diatomaceous Earth Uses: Indestructible cell walls embedded with silica accumulate forming diatomaceous earth; used in polishing, filtration of oils and syrups. (any 2)	0.5 mark 0.5 mark 1 mark	5
32	a) Chemiosmosis Comparison: i) Energy Source: Light energy (photons) in chloroplasts vs Chemical oxidation of substrates (NADH/FADH₂) in mitochondria. ii) Proton Accumulation Site: Thylakoid lumen in chloroplasts vs Intermembrane space in mitochondria. iii) Direction of Proton Flow: From Thylakoid Lumen -> Stroma in chloroplasts vs Intermembrane Space -> Matrix in mitochondria. b) Effect of Ionophore on Thylakoids: • Impact: ATP synthesis will STOP / BE SEVERELY INHIBITED. • Reasoning: ATP synthesis relies on a proton gradient across thylakoid membrane. An ionophore dissipates the proton gradient by allowing H⁺ to leak freely, eliminating proton motive force through F₀-F₁ ATP synthase. OR a) Calvin Cycle Energy Requirements: i) Per CO₂ fixed: 3 ATP and 2 NADPH used in total. - Reduction step: 2 ATP + 2 NADPH - Regeneration step: 1 ATP + 0 NADPH ii) Crucial nature of Regeneration: Uninterrupted supply of RuBP (ribulose 1,5-bisphosphate), the primary CO₂ acceptor, is required for continuous cycle continuation. b) Indirect Effects of Water Stress: 1. Stomatal closure reduces CO₂ availability. 2. Leaf wilting reduces leaf surface area and metabolic activity of photosynthetic enzymes.	1 mark 1 mark 1 mark 2 marks (1+1) OR 1 marks 1 mark 2 marks (1+1)	5
33	DNA Content and Chromosome Count across Cell Cycle: [Given: G₁ phase has DNA = 2C, Chromosomes = 2n = 46] i) Late S Phase: DNA content = 4C Chromosome count = 46 (2n)	1 mark	

	ii) Metaphase: DNA content = $4C$ Chromosome count = 46 (2n) iii) Anaphase: DNA content = $4C$ Chromosome count = 92 (split centromeres form 92 daughter chromosomes) b) Cytokinesis Comparison (Figure A vs B): • Figure A: Cytokinesis in Animal Cell via Cell Furrow formation (centripetal direction - outside to inside). • Figure B: Cytokinesis in Plant Cell via Cell Plate formation / (centrifugal direction - inside to outside). OR a) Energy Profile Analysis: i) Type of Reaction: Endothermic reaction. Reason: Free energy of products ($E_p = 40 \text{ kJ/mol}$) is higher than reactants ($E_r = 15 \text{ kJ/mol}$) (ΔG is positive). ii) Difference between E_{a1} and E_{a2}: E_{a1} is activation energy of uncatalyzed reaction, whereas E_{a2} is activation energy lowered by enzyme catalyst. iii) Peak Points: Represent Transition State (unstable high-energy activated complex). b) Competitive Inhibition Dynamics: i) Molecule X is a Competitive Inhibitor that closely resembles substrate S and competes for active site of enzyme. ii) Medical Application: Control of bacterial pathogens, Malonate inhibiting succinic dehydrogenase.	1 mark 1 mark 2 marks (1+1) OR 1.5 marks 1 mark 0.5 mark 1 mark 1 mark	5
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