

KENDRIYA VIDYALAYA SANGATHAN ERNAKULAM REGION
MARKING SCHEME (2025-26)
CLASS XII PREBOARD I EXAMINATION
BIOLOGY (044)

S.No.	Answers	Marks
1.	(D) Pollen grain → Male gametophyte in angiosperms is the pollen grain (haploid structure with vegetative & generative cells).	1
2.	(B) Maize → Maize is monoecious (male & female flowers on the same plant). Hence pollination may be geitonogamy or xenogamy .	1
3.	(D) a → c → e → d → b → Order of events: FSH secretion → follicle growth & oogenesis → LH surge → ovulation → corpus luteum formation.	1
4.	(C) Hybrid: Heavy = 1: 31 → After six generations in ¹⁵ N medium (semiconservative replication of DNA in E. coli), ratio of hybrid to heavy DNA = 1: 31.	1
5.	(D) Removal of introns in RNA and occurs in eukaryotes → Splicing = removal of non-coding introns from hnRNA → mature mRNA in eukaryotes.	1
6.	(D) Australopithecines → Fossil with >700 cc brain & tool use cannot be Australopithecus (≈400 cc). Fits <i>Homo habilis</i> or later.	1
7.	(C) 50 % Pink: 50 % White → Cross between pink (Rr) × white (rr) shows incomplete dominance → ½ pink, ½ white.	1
8.	(B) Insertion of G after C in codon 4 → Addition or deletion of a single base shifts the reading frame → frameshift mutation.	1
9.	(A) Only Q (Ascariasis) → Ascariasis transmitted by ingesting eggs in contaminated food/water; others (malaria, filariasis, dengue) spread via mosquito bite.	1
10.	(B) UAC & AUG → Codon on mRNA = AUG (start codon for methionine); anticodon on tRNA = UAC (complementary).	1
11.	(B) I, III and V → Restriction enzymes cut a little away from centre of palindrome, at same sites on opposite strands, leaving sticky ends.	1
12.	(B) Cyclosporin A → Immuno-suppressant from fungus <i>Trichoderma polysporum</i> ; prevents rejection in organ transplants.	1
13.	(C) Assertion true, Reason false → Cells of stamen never develop into embryo without fertilisation.	1
14.	(C) Assertion true, Reason false → Hugo de Vries proposed mutation theory; mutations cause speciation but they are sudden , not slow.	1
15.	(C) A is true but R is false → Heroin = smack (True); but it is an opioid (False).	1
16.	(A) Both A and R are true and R is the correct explanation of A → Insertion of foreign DNA in β-galactosidase gene inactivates it → colourless (white) colonies due to insertional inactivation .	1

17.	<p>A. (a) P1: <i>Autogamy</i> P2: <i>Geitonogamy</i> (b) Advantage: Ensures seed set even in absence of pollinators (since same plant pollen used). Disadvantage: No genetic variation; offspring genetically similar to</p> <p style="text-align: center;">OR</p> <p>(a) The parts A, B and C are identified as A – Synergids, B – Micropyle, C – Hilum Any two ($\frac{1}{2} + \frac{1}{2}$) (b) A represents synergids and possess special cellular thickenings at their micropylar tip called filiform apparatus which guides the pollen tube to enter into the embryo sac. ($\frac{1}{2} + \frac{1}{2}$)</p>	$\frac{1}{2} * 4 = 2$																								
18.	<p>A. a–Hydrogen bonds. b–Purines, i.e., adenine or thymine. c–Pentose sugar (deoxyribose sugar). d—5' end.</p> <p style="text-align: center;">OR</p> <p>B. Turner’s syndrome Female Monosomy Nondisjunction causing loss of one X chromosome (Chromosomal disorder)</p>	$\frac{1}{2} * 4 = 2$																								
19.	<p>A(a) Cannabinoid molecule. (b) By smoking or oral ingestion. (c) Cannabinoids generally affect the cardiovascular system of body. (d) <i>Cannabis sativa</i></p>	$\frac{1}{2} * 4 = 2$																								
20.	<p>A. (i) Scientists – Stanley Cohen and Herbert Boyer (1972) → 1 mark (ii) BAC (Bacterial Artificial Chromosome) – a cloning vector used to insert and replicate large DNA fragments in <i>E. coli</i> → 1 mark</p> <p style="text-align: center;">OR</p> <p>B. Alien gene inserted at Pvu I site (in <i>ampR</i> region) → ampicillin resistance lost, tetracycline resistance retained. Recombinant bacteria grow on tet but not on amp plates (insertional inactivation).</p>	1+1=2 $\frac{1}{2} + \frac{1}{2} + 1$																								
21.	<p>Fish farm = artificial ecosystem is a man-maintained ecosystem, with biotic & abiotic components. Abiotic factors – any two (light, soil, pH)</p>	$\frac{1}{2} + \frac{1}{2} = 1$ $\frac{1}{2} + \frac{1}{2} = 1$																								
22.	<p>(i) Oocyte donation / IVF with donor egg – for failure to produce normal egg → 1 m (ii) ICSI / Donor sperm – for low sperm count → 1 m (iii) IVF – for blocked fallopian tube → 1 m</p>	3																								
23.	<p>(a) Apomixis $\frac{1}{2}m$, apomictic seeds $\frac{1}{2}m$ (b) maintain heterozygosity, no segregation of characters, no need to buy hybrid seeds every year (any two - $\frac{1}{2} + \frac{1}{2}$) (c) Differs from parthenocarpy – Apomixis forms seeds, Parthenocarpy forms seedless fruits → $\frac{1}{2} m$ Genetic aspect – Apomictic offspring clonal, parthenocarpic fruit no progeny → $\frac{1}{2} m$</p>	3																								
24.	<p>A. (a) Parental genotypes — (1 mark)</p> <p>Purple plant = Pp (heterozygote) and Yellow plant = pp (homozygous recessive).</p> <p>Cross Pp × pp → expected 1/2 Pp (purple) and 1/2 pp (yellow) → matches 2 purple : 2 yellow.</p> <p>(b) Punnett square for cross between two purple offspring (Pp × Pp) — (1 mark)</p> <table style="margin-left: 40px;"> <tr> <td style="padding-right: 10px;">P</td> <td style="padding-right: 10px;">p</td> <td></td> </tr> <tr> <td colspan="2" style="border-top: 1px solid black;"></td> <td></td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 5px;">P</td> <td style="padding-right: 5px;"> </td> <td style="padding-right: 5px;">PP</td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 5px;">p</td> <td style="padding-right: 5px;"> </td> <td style="padding-right: 5px;">Pp</td> </tr> <tr> <td colspan="2" style="border-top: 1px solid black;"></td> <td></td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 5px;">p</td> <td style="padding-right: 5px;"> </td> <td style="padding-right: 5px;">Pp</td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 5px;"></td> <td style="padding-right: 5px;"> </td> <td style="padding-right: 5px;">pp</td> </tr> <tr> <td colspan="2" style="border-top: 1px solid black;"></td> <td></td> </tr> </table>	P	p					P		PP	p		Pp				p		Pp			pp				3
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	(c) Ratios — (1 mark) Genotypic ratio: 1 PP : 2 Pp : 1 pp. Phenotypic ratio: 3 Purple : 1 Yellow.	
25.	(a) Factors disturbing H–W equilibrium – Mutation, Migration, Genetic drift, Non-random mating/Natural selection → 1 m (b) $2pq = 2 \times 0.3 \times 0.7 = 0.42$; Observed 0.49 \neq Expected 0.42 → Not in equilibrium → 2 m	3
26.	(a) False – Floccs reduce BOD → $\frac{1}{2} + \frac{1}{2}$ (b) False – Mycorrhiza mutualistic, not parasitic → $\frac{1}{2} + \frac{1}{2}$ (c) False – Dragon flies are useful to get rid of mosquitoes → $\frac{1}{2} + \frac{1}{2}$	3
27.	(a) Enzyme – BamHI → 1 m Explanation (Name logic from Bacillus amyloliquefaciens strain H) – 1m (b) Cuts between two G's of sequence GGATCC; produces sticky ends 5'-GATC-3' → 1 m	3
28.	(a) Plot population vs year – curve rises then levels off → 1 m (draw graph) (b) Type – Logistic (S-shaped) growth → 1 m Description – Initial slow, rapid phase, then stable at K → 1 m	3
29.	(i) Impact – Rapid population growth / population explosion → 1 m (ii) Ideal contraceptive – IUCD (Copper-T / Multiload 375); Reason – long-term, reversible, safe for married women → 1 + 1 = 2 m (iii) Importance – Controls population; ensures maternal–child health / economic stability → 1 m OR iii) (a) Non-medicated IUD – Lippes Loop → 1/2 m (b) Barrier method – Condom → 1/2 m	4
30.	(a) Type of immunity – Artificially acquired active immunity → 1 m The inoculum triggered the body to produce antibodies, which kill the new virus that enters the body → 1 m (b) Forms of immunity by vaccination – Active (acquired by vaccine) + Passive (ready-made antibodies) → 2 m OR (b) (i) A foetus receives antibodies from its mother through the placenta → Naturally acquired passive immunity (ready-made maternal IgG antibodies) → 1 mark (ii) A person receives blood transfusion from a vaccinated donor → Artificially acquired passive immunity (transfer of ready-made antibodies through serum) → 1 mark	4
31.	A. (i) Alien species invasion causes biodiversity loss by out-competing native species for food and habitat. → 1 m Examples (any two): Nile Perch – introduced into Lake Victoria, eliminated native cichlid fish. → 1 m Lantana camara / Eichhornia crassipes (water hyacinth) – block sunlight, deplete oxygen, hinder native growth. → 1 m Clarias gariepinus (African catfish) – predatory, threatens Indian catfishes. → 1 m (ii) Regions declared biodiversity hotspots – contain high species richness and high endemism; identified for conservation priority. → 1 m Examples: Western Ghats, Eastern Himalayas. → 1 m OR B. (i) Ecological pyramid of biomass (values kg/m ²): Producers 4 → Herbivores 11 → Small fish 25 → Large fish 37; Trophic levels – Producers → Primary → Secondary → Tertiary. → diagram 2 m	5

	<p>Pyramid inverted. → 1 m</p> <p>(ii) (a) Gross Primary Productivity = NPP + Respiration = 45000 + 40367 = 85367 kJ m⁻² y⁻¹ → 1 m</p> <p>(b) Net production decreases from producers to top carnivores due to energy loss as heat at each trophic level (10 % law). → 1 m</p>	
32.	<p>A.</p> <p>(i) Bt = <i>Bacillus thuringiensis</i> → 1 m</p> <p>A gene coding for insecticidal protein (cry gene) was isolated and inserted into cotton genome → Cry I Ac & Cry II Ab. → 1 m</p> <p>(ii) Mechanism of pest death → 3 m</p> <p>Cry protein inactive in plant; when ingested by bollworm larvae, converted to active toxin in alkaline mid-gut → 1 m</p> <p>Binds to receptors on mid-gut epithelium → forms pores → cell lysis → gut rupture → death → 2 m</p> <p style="text-align: center;">OR</p> <p>B. (a) Defence mechanism – RNA interference (RNAi) → 1 m</p> <p>Silencing of specific mRNA by double-stranded RNA (dsRNA) and prevent its translation thereby stop the production of the harmful or undesired protein. → 1 m</p> <p>(b) Done in tobacco plant → 1 m</p> <p>(c) Pathogen – Nematode <i>Meloidegryne incognitia</i> → 1 m</p> <p>(d) Vector – <i>Agrobacterium tumefaciens</i> (Ti plasmid) → 1 m</p>	5
33.	<p>A) a. 5' UCAGUACA3' - 1m.</p> <p>3' AGTCATGT 5' – Template, 5'TCAGTACA 3' - coding – 1m</p> <p>b. i) AUG & UAA/UAG/UGA – ½+ ½ m</p> <p>ii) Methionine & no amino acids – ½+ ½ m</p> <p>iii) UTR – untranslated regions -1m</p> <p style="text-align: center;">OR</p> <p>B.(a) Organic compound at point 'c' – Amino acids (glycine, alanine, etc.) → 1 m</p> <p>(b) Temperature maintained ≈ 800 °C → 1 m</p> <p>(c) Gases – CH₄, NH₃, H₂, and H₂O vapour → 1 m</p> <p>(d) Hypothesis – Oparin–Haldane theory of chemical evolution → 1 m</p> <p>Scientists who performed – Stanley Miller and Harold Urey (1953) → 1 m</p>	5