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 *Homo habilis* 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 *Trichoderma polysporum*; prevents rejection in organ transplants.	1
13.	**(C)** Assertion true, Reason false → Cells of stamen never develop into embryo without fertltisation.	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.	A. (a) P1: *Autogamy* P2: *Geitonogamy* (b)Advantage: Ensures seed set even in absence of pollinators (since same plant pollen used). Disadvantage: No genetic variation; offspring genetically similar to **OR** (a) The parts A, B and C are identified as A – Synergids, B – Micropyle, C – Hilum Any two (½+½) (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. (½ + ½)	½*4 =2
18.	A. a–Hydrogen bonds. b–Purines, i.e., adenine or thymine. c–Pentose sugar (deoxyribose sugar). d—5' end. **OR** B. Turner's syndrome Female Monosomy Nondisjunction causing loss of one X chromosome (Chromosomal disorder)	½*4 =2
19.	A(a) Cannabinoid molecule. (b) By smoking or oral ingestion. (c) Cannabinoids generally affect the cardiovascular system of body. (d) Cannabis sativa	½*4 =2
20.	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 E. coli → 1 mark **OR** B. Alien gene inserted at Pvu I site (in ampR region) → ampicillin resistance lost, tetracycline resistance retained. Recombinant bacteria grow on tet but not on amp plates (insertional inactivation).	1+1=2 ½+½+1
21.	Fish farm = artificial ecosystem is a man-maintained ecosystem, with biotic & abiotic components. Abiotic factors – any two (light, soil, pH)	½+½=1 ½+½=1
22.	(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	3
23.	(a) Apomixis ½m, apomictic seeds ½m (b) maintain heterozygosity, no segregation of characters, no need to buy hybrid seeds every year (any two - ½ + ½) (c) Differs from parthenocarpy – Apomixis forms **seeds**, Parthenocarpy forms **seedless fruits** → ½ m Genetic aspect – Apomictic offspring clonal, parthenocarpic fruit no progeny → ½ m	3
24.	A. (a) Parental genotypes — (1 mark) Purple plant = Pp (heterozygote) and Yellow plant = pp (homozygous recessive). Cross Pp × pp → expected 1/2 Pp (purple) and 1/2 pp (yellow) → matches 2 purple : 2 yellow. (b) Punnett square for cross between two purple offspring (Pp × Pp) — (1 mark) 　 P p 　———————— P | PP | Pp | 　———————— p | Pp | pp |	3

	(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 $0.42 \rightarrow$ Not in equilibrium → 2 m	3
26.	(a) False – Flocs reduce BOD → ½+½ (b) False – Mycorrhiza mutualistic, not parasitic → ½+½ (c) False – Dragon flies are useful to get rid of mosquitoes → ½+½	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/m²): Producers 4 → Herbivores 11 → Small fish 25 → Large fish 37; Trophic levels – Producers → Primary → Secondary → Tertiary. → diagram 2 m	5

	Pyramid inverted. → 1 m (ii) (a) Gross Primary Productivity = NPP + Respiration = 45000 + 40367 = 85367 kJ m^{-2} y^{-1} → 1 m (b) Net production decreases from producers to top carnivores due to energy loss as heat at each trophic level (10 % law). → 1 m	
32.	A. (i) Bt = Bacillus thuringiensis → 1 m A gene coding for insecticidal protein (cry gene) was isolated and inserted into cotton genome → Cry I Ac & Cry II Ab. → 1 m (ii) Mechanism of pest death → 3 m Cry protein inactive in plant; when ingested by bollworm larvae, converted to active toxin in alkaline mid-gut → 1 m Binds to receptors on mid-gut epithelium → forms pores → cell lysis → gut rupture → death → 2 m **OR** B. (a) Defence mechanism – RNA interference (RNAi) → 1 m 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 (b) Done in tobacco plant → 1 m (c) Pathogen – Nematode *Meloidegyne incognitia* → 1 m (d) Vector – *Agrobacterium tumefaciens* (Ti plasmid) → 1 m	5

33.	A) a. 5' UCAGUACA3'- 1m.
	3' AGTCATGT 5' – Template, 5'TCAGTACA 3'- coding – 1m
	b. i) AUG & UAA/UAG/UGA – ½+ ½ m
	  ii) Methionine & no amino acids – ½+ ½ m
	  iii) UTR – untranslated regions -1m
	 OR
	B.(a) Organic compound at point 'c' – Amino acids (glycine, alanine, etc.) → 1 m
	(b) Temperature maintained ≈ 800 °C → 1 m
	(c) Gases – CH_4, NH_3, H_2, and H_2O vapour → 1 m
	(d) Hypothesis – Oparin–Haldane theory of chemical evolution → 1 m
	  Scientists who performed – Stanley Miller and Harold Urey (1953) → 1 m
		5