B.K. BIRLA CENTRE FOR EDUCATION

SARALA BIRLA GROUP OF SCHOOLS
A CBSE DAY-CUM-BOYS' RESIDENTIAL SCHOOL

TERM-I EXAMINATION 2025-26
BIOLOGY MARKING SCHEME (044)

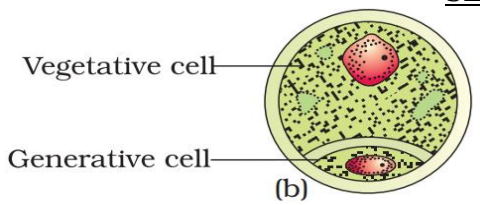
Class: XII | Duration: 3 Hr
Date: 10/09/2025 | Max. Marks: 70

SECTION-A

Q. No. 1 to 12 are multiple choice questions. Only one of the choices is correct. Select and write the correct choice as well as the answer to these questions.

Q.no	Question	Marks
1.	C. Maize	1
2.	B. A male gamete and two polar nuclei	1
3.	A. Sperm penetrates the egg, zygote forms, implantation occurs	1
4.	B. Completion of meiosis II.	1
5.	C. IUT	1
6.	D. Aa x aa	1
7.	B. It is a single stranded DNA.	1
8.	A. 2000 bp/s	1
9.	A. Common set of functions in groups of different ancestry.	1
10.	D. AIDS	1
11.	D. Pseudomonas	1
12.	C. a-iv, b-iii, c-ii, d-i	1
13.	C. A is true but R is false.	1
14.	A. Both A and R are true, and R is the correct explanation of A.	1
15.	C. A is true but R is false.	1
16.	C. A is true but R is false.	1

SECTION-B

17. 

1+1

the functions of any two parts labelled: Exine ,Intine and germ pore.

18. Two copper-related IUDs & mechanism: 1+1
Examples: CuT, Cu7, Multiload 375
Action: Copper ions released suppress sperm motility and viability, making fertilization unlikely; also increase phagocytosis of sperm in the uterus.

19. Reason: Humans have a long generation time, produce few offspring, and controlled crosses are not possible. Alternate method: Pedigree analysis 1+1

20. The first human-like hominin is Homo habilis, meaning "handy man". A key feature of Homo habilis was their ability to use and make simple stone tools. 1+1

21. Disease: AIDS 1+1
Pathogen: HIV (Human Immunodeficiency Virus)

Weak immunity reason: HIV destroys helper T-lymphocytes, reducing immune response.

SECTION-C

22. Seed X is produced by apomixis whereas seed Y is a product of sexual reproduction. 1.5
A. Seed X- 3 embryos, 1embryo sac, 1ovule.
B. The nucellar cells grow mitotically and develop into the embryos by asexual reproduction. 0.5
C. The plants growing from seed X will have to share the resources/endosperm so there is a possibility of some plant being undernourished/; only one plant in seed Y will use the entire endosperm for its growth or as the plants of seed X are clones they will not show variation and may succumb to environmental stress;/ plants from seed Y will have genetic variation and so can show greater adaptability. 1

23. The first meiotic division is completed in the primary oocyte during oogenesis. 1
Then primary oocyte undergoes first meiotic division to form a large haploid secondary oocyte and a tiny first polar body. 1
The primary oocyte comprises of 46 chromosomes, whereas secondary oocyte and first polar body have 23 chromosomes each. 1

24. Amniocentesis: 1
Role: Prenatal diagnostic test where amniotic fluid is withdrawn to detect chromosomal abnormalities, genetic disorders, and fetal sex. 1
Misuse & ban: Misused for sex determination leading to female foeticide, hence banned in India under the PCPNDT Act. 1

25. A. During replication, Adenine pairs with thymine in DNA; during transcription, adenine pairs with uracil in RNA. 1
B. In retrovirus the nucleic acid is RNA and it is used to synthesize DNA; the process is called reverse transcription. 1
C. It is a highly energy-rich process/ or as per the need only the gene coding for a specific protein is transcribed. 1

26. (a) Sum Total of All the Allele Frequencies is 1: Let there be two alleles A and a in a population. The frequencies of alleles A and a are ‘p’ and ‘q’ respectively. 1
The frequency of AA individuals in a population is p 2 and it can be explained that the probability that an allele A with a frequency of p would appear on both the chromosomes of a diploid individual is simply the product of the probabilities, i.e., p2 Similarly, the frequency of aa is q2 and that of Aa is 2pq. 1
p2+ 2pq+q 2)= 1,where p 2 represents the frequency of homozygous dominant genotype, 2pq represents the frequency of the heterozygous genotype and q 2 represents the frequency of the homozygous recessive. 1
(b) Factors that affect Hardy–Weinberg equilibrium:
(i) Gene migration or gene flow (ii) Genetic drift (iii) Mutation
(iv)Genetic recombination (v) Natural Selection (Any 2)

27. A. Genotypes of c-aa and d-AA/Aa. 1
B. i. autosomal ii. recessive 1
C. Short stature: Individuals with Turner's syndrome are typically shorter than average. 1
Ovarian failure: The ovaries may not develop properly, leading to infertility.

28. A. Streptokinase produced by the bacterium Streptococcus as clot buster. Statins produced by the yeast Monascus purpureus have been commercialised as blood-cholesterol lowering agents. It acts by competitively inhibiting the enzyme responsible for synthesis of cholesterol. 2

B. cyclosporin A, that is used as an immunosuppressive agent in organ-transplant patients, is produced by the fungus Trichoderma polysporum. 1

SECTION-D

29. Given coding (sense) strand (5'→3')
5'– ATG ACC GUA UUU UCU GUA GUG CCC GUA CUU CAG GCA UAA –3'
A. Template strand and mRNA
Template strand (3' → 5', complementary): 2
3'– TAC TGG CAT AAA AGA CAT CAC GGG CAT GAA GTC CGT ATT –5'
mRNA (transcribed, 5' → 3'): 1
5'–AUG ACC GUA UUU UCU GUA GUG CCC GUA CUU CAG GCA UAA–3'
(codon triplets: AUG | ACC | GUA | UUU | UCU | GUA | GUG | CCC | GUA | CUU | CAG | GCA | UAA) 1
B. Number of amino acids on translation
Translation starts at AUG and stops at UAA (terminal codon). There are 12 sense codons before the stop, so the polypeptide will have 12 amino acids. 1
(Stop codon does not code an amino acid.)
C. If the codon GUA in the transcribed mRNA is an intron effect on mature mRNA/hnRNA
i) In a bacterium: bacteria generally lack introns (most bacterial mRNAs are not spliced), so the primary transcript = mature mRNA. The GUA triplet would remain in the mRNA → translation yields the original 12-amino-acid polypeptide.
ii) In humans (eukaryote): hnRNA is processed — introns are removed by the spliceosome and exons ligated; the GUA intron would be removed from the pre-mRNA. Removing that 3-nt intron preserves the reading frame. The mature mRNA becomes:
5'–AUG ACC UUU UCU GUA GUG CCC GUA CUU CAG GCA UAA–3'
(codons now: AUG | ACC | UUU | UCU | GUA | GUG | CCC | GUA | CUU | CAG | GCA | UAA)
Translation now gives 11 amino acids

OR

Role of tRNA in translation:
tRNA molecules carry specific amino acids to the ribosome, recognize mRNA codons via their anticodon, and catalyse peptide bond formation by positioning the amino acids in the growing polypeptide chain — thereby decoding mRNA into protein.

30. A. i) Using anaerobic instead of aerobic bacteria in secondary treatment will not reduce BOD effectively, as anaerobes work slower in degrading organic matter in open aeration conditions. This will leave higher BOD in the effluent, leading to oxygen depletion in downstream water and harming aquatic life. 4
ii) Anaerobic conditions (absence of oxygen) must be maintained in a sludge digester.
iii) The slurry is rich in nitrogen, phosphorus, potassium and organic matter because microbial digestion releases these nutrients from organic waste.
iv) Biogas composition: Methane (~50–70%), CO_2 (~30–40%), traces of H_2S.
Use: As a fuel for cooking, lighting, and electricity generation.

OR

iv) Importance of primary treatment: Removes large suspended solids and reduces the organic load (BOD) before biological treatment, improving efficiency of the STP.

SECTION-E

31. A. i) It is called proliferative phase because the endometrium regenerates and thickens under the influence of oestrogen. 5
ii) Corpus luteum degenerates into corpus albicans, stopping progesterone and oestrogen

secretion.
iii) Corpus luteum is formed from the ruptured follicle and secretes progesterone (and some oestrogen).
iv) LH surge occurs around mid-cycle (~14th day), triggering ovulation.
v) Uterine endometrium breaks down and is shed along with blood and tissue fluid.
B.
i) Affected parameters: Sperm count, sperm motility, testosterone level.
ii) Spermiation will be affected.
iii) Male accessory glands (seminal vesicles, prostate, bulbourethral) secrete fluids that provide nutrients, lubrication, and an alkaline medium for sperm.
iv) Diagram

32. A:i) Colour blindness: X-linked recessive. A normal couple can have a colour-blind son if the mother is a carrier (XcX) and the father is normal (X^NY). The son inherits Y from father and the mutant Xc from mother → colour blind. 3+2
Thalassaemia: autosomal recessive. Two phenotypically normal parents can have an affected child if both are carriers (Aa × Aa) — child may inherit the mutant allele from both parents (aa) and express the disease.
Reason: different chromosomal locations and modes of inheritance (X-linked vs autosomal) lead to these outcomes.
ii)To get children with A, B, AB and O, parents must be blood group A and blood group B with genotypes $I^Ai \times I^Bi$.
Gametes: I^A or i × I^B or i → offspring genotypes: I^AI^B (AB), I^Ai (A), I^Bi (B), ii (O) — all four phenotypes possible.

33. (a) Concentration of nicotine is maximum at 10 minutes/ conc. of nicotine increases steadily in the blood to reach 45mg/cm3 1 2
(b) The Concentration of CO will increase resulting in reduced concentration of haemboundoxygen. 2
c) withdrawal syndrome is aggressive behaviour. 3
(d) Nicotine results in stimulating the adrenal gland which results in release of adrenaline / nor - adrenaline in the blood resulting in increase of blood pressure and heart rate. 2

OR

(d) Chemical carcinogens present in tobacco smoke are the major cause of lung cancer. The cigarette smoke irritates the air passages of the lungs causing them to produce mucus which causes cough resulting in enlarging air spaces/reduce surface area/lose their elasticity (any point can be mentioned) thus difficulty in breathing causing emphysema.