

SOLUTIONS

Senior Secondary School Examination, 2025

BIOLOGY (Subject Code-044)

[Paper Code: 57/7/3]

Maximum Marks: 70

| Q.No. | EXPECTED ANSWER/VALUE POINTS | MARKS | TOTAL MARKS |
|------------------|--|-------|-------------|
| SECTION A | | | |
| 1. | ↓ (B) / 3'TCCACCCGATGC 5' | 1 | 1 |
| 2. | (B) / XO type of chromosomes determine male sex in grasshoppers. | 1 | 1 |
| 3. | (D) / Production of insulin by rDNA technique | 1 | 1 |
| 4. | B) / Completion of Meiosis II | 1 | 1 |
| 5. | (A) / 8.1% | 1 | 1 |
| 6. | (B) / ELISA – Antigen antibody interaction | 1 | 1 |
| 7. | (A) / P (53%) p(47%) | 1 | 1 |
| 8. | (C) / a-ii, b-i, c-iv, d-iii | 1 | 1 |
| 9. | (A) / Multicarpellary, Apocarpous | 1 | 1 |
| 10. | (B) / Food chain-‘P’ – Grazing Food Chain-‘Q’ – Detritus | 1 | 1 |
| 11. | (D) / Annealing is required to separate both the strands of template DNA. | 1 | 1 |
| 12. | (D) / Morphine is often given to persons who have undergone surgery as a painkiller. | 1 | 1 |
| 13. | (A) / Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). | 1 | 1 |
| 14. | (A) / Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). | 1 | 1 |
| 15. | (A) / Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). | 1 | 1 |
| 16. | (C) / Assertion (A) is true, but Reason (R) is false. | 1 | 1 |
| SECTION B | | | |
| 17. | (a) -DNA from bacteria can be released from the cells by digesting the cell envelope with enzyme lysozyme. -Protein and RNA are removed by treating with proteases and ribonuclease respectively. -Other molecules can be removed by appropriate treatments. -Purified DNA ultimately can be precipitated out after the addition of chilled ethanol. | ½x4 | |

| | | | |
|-----|---|--------------------------|---|
| | <p style="text-align: center;">OR</p> <p>(b)-Two DNA sequences coding for the polypeptide A and B have been prepared (in vitro). -These DNA sequences were introduced into the plasmid of <i>E. coli</i> to produce the polypeptides. -Polypeptide chains 'A' and 'B' were produced separately in the bacterium. -They have been extracted and combined by creating disulphide bonds to form human insulin.</p> | 1/2x4 | 2 |
| 18. | <p>(a) <i>Dryopithecus / Ramapithecus</i> (Any one primate) (b) Tanzania/ Ethiopia (Any one place) (c) <i>Australopithecines</i> (d) <i>Homo erectus</i></p> | 1/2x4 | 2 |
| 19. | <p>(a) Klinefelter's syndrome (b) Development of breasts or Gynaecomastia / underdeveloped masculine character/ sterility/ tall stature with feminised character. (c) Aneuploidy/ Non disjunction or Failure of segregation of chromatids during cell division results in gain of extra X chromosome in male / trisomy of sex chromosome.</p> | 1/2 1/2 1 | 2 |
| 20. | <p>(a)-Absorbs phosphorus from soil and passes it to the plant. -Plants became resistant to root-borne pathogens. -Plants become tolerant to salinity and drought. -Overall increase in plant growth and development. OR (b) (i) Secondary lymphoid organs provide sites for interaction of lymphocytes with antigens , which then proliferate to become effector cells. (ii)Spleen : Has lymphocytes and phagocytes , Filters blood by trapping blood borne microorganisms.</p> | 1/2x4 1/2x2 1/2x2 | 2 |
| 21. | <p>(a) Signals for parturition arise from fully developed foetus and placenta which induce mild uterine contractions, called foetal ejection reflex, this triggers release of oxytocin from maternal pituitary, which act on uterine muscle and causes stronger uterine contractions. OR (b) (i) Menstrual cycle ceases / menopause occur around 50 years of age. (ii) During oogenesis Meiosis I and II are unequal divisions which form one large cell and a smaller polar body / The unequal cell formation will ensure that the large cell has more cytoplasm and more nutrient reserve for better survival of the zygote. Meiosis I and II are equal divisions in spermatogenesis.</p> | 1/2x4 1 1/2 1/2 | 2 |
| | | | |

SECTION C

22.

- Lymphocytes from the blood of the patient are grown in a culture outside the body, A functional ADA cDNA is then introduced into these lymphocytes, which are subsequently returned to the patients.
- It is not a permanent cure.
- If gene isolated from marrow cells producing ADA is introduced into lymphocytes at early embryonic stage.

1/2x3

1/2

1

3

23.

In an aquatic ecosystem-Grazing food chain (GFC).
In a terrestrial ecosystem-Detritus food chain (DFC).

Differences –

| Grazing Food Chain | Detritus food chain |
|---|--|
| Transfer of energy starts from producers in a food chain. | Transfer of energy starts from detritus /decomposing organic matter. |
| More energy flows through this. | Less amount of energy flows through this . |
| Energy obtained from Sun | Energy obtained from dead organic matter |
| Major conduit of energy in aquatic system | Major conduit of energy in terrestrial system |

(Any two differences)

1/2

1/2

1x2

3

24.

-

(Award 1/2 mark for each correct sequence of coding or template strand , and their correct polarity , promoter , terminator site)

- DNA dependent RNA polymerase is the enzyme.

1/2x4

1

3

| | | | |
|-----|--|--|----------|
| | | | |
| 25. | <p>(a) Oral Pills Merits – Effective with less side effects/reversible/ cost effective/ user friendly.</p> <p>Demerits – Have side effects when taken for a long time/ Pills if not taken and not repeated in a particular pattern may fail to prevent conception/wrong usage may promote conception</p> <p>Surgical Method : Merits – Highly effective / Block gamete transport</p> <p>Demerits – Not reversible / Can affect health if not performed in hygienic conditions.</p> <p>(b)IUD’s prevent conception by -Increase phagocytosis of sperms. -Some suppress sperm motility and fertilizing capacity of sperms by releasing Cu⁺⁺ ions. - Hormone releasing IUD’s make uterus unsuitable for implantation and cervix hostile to sperms.</p> <p style="text-align: right;">(Any two points)</p> | <p>½</p> <p>½</p> <p>½</p> <p>½</p> <p>½+½</p> | <p>3</p> |
| 26. | <p>(a)This is adaptive radiation leading to divergent evolution. Example – Many varieties of Darwin’s finches on the same island arose from the original seed-eating finches with altered beaks enabling them to become insectivorous and vegetarian finches / A number of marsupials different from each other evolved from an ancestral stock but all within the Australian island /or any other relevant example.</p> <p>(b)</p> <ul style="list-style-type: none"> • Example-Evolution of Placental mammals and Australian Marsupials or any other corresponding example of these categories respectively. • Convergent evolution. | <p>½</p> <p>1</p> <p>1</p> <p>½</p> | <p>3</p> |
| 27. | <p>(a) Animals that have their DNA manipulated to possess and express an extra or foreign gene are known as transgenic animals.</p> <p>(b)(i)Vaccine safety – Transgenic mice are being developed for use in testing the safety of vaccines before they are used on humans. Transgenic mice are being used to test the safety of the polio vaccine.</p> <p>(ii)Biological products – Transgenic cow-Rosie produced human protein enriched milk(2.4 gram per litre).The milk contains human alpha-lactalbumin and was nutritionally a more balanced product for human babies than natural cow milk or any other example.</p> | <p>1</p> <p>1</p> <p>1</p> | <p>3</p> |
| 28. | <p>Typhoid – Sustained high fever 39-40°C/ stomach-pain/ constipation.</p> <p>Pneumonia- severe problems in respiration/in severe cases the lips and fingernails may turn grey to bluish in colour/ chills /cough</p> | <p>1</p> <p>1</p> | |

| | | | |
|-----|---|--|---|
| | Malaria- If chills and high fever occurs in every 3 – 4 days. | 1 | 3 |
| | SECTION D | | |
| 29. | <p>(a)</p> <ul style="list-style-type: none"> • Sewage treatment plant • used to treat sewage water before it can be released into water body. <p>(b) Air helps in growth of flocs (aerobic bacteria along with fungal filaments), which decompose organic matter in the sewage using oxygen.</p> <p>(c)(i) Bacterial ‘flocs’ settle down to form activated sludge.</p> <p style="text-align: center;">OR</p> <p>(c) (ii) BOD is directly related to the measure of the organic matter present in water/ Greater the BOD more is the polluting potential</p> | <p>½</p> <p>½</p> <p>1+1</p> <p>1</p> <p>1</p> | 4 |
| 30. | <p>(a) A – Geitonogamy B – Autogamy</p> <p>(b) -Anthers and stigma to be close to each other in a bisexual flower cleistogamous flower / closed flower / Pollen release and stigma receptivity at the same time (Any two conditions)</p> <p>(c)(i) Advantage → Assured seed set /no dependence on pollinators / pure breed can be obtained.</p> <p>Disadvantage → No genetic variation / Inbreeding depression</p> <p style="text-align: center;">OR</p> <p>(c) (ii)</p> <ul style="list-style-type: none"> • <i>Oxalis/ Viola</i> or common pansy/ <i>Commelina</i>. • Some flowers do not open at all /cleistogamy / closed flower hence show autogamy. | <p>½</p> <p>½</p> <p>1+1</p> <p>½</p> <p>½</p> <p>½</p> <p>½</p> | 4 |
| | SECTION E | | |
| 31. | <p>(a) (i) Alien species invasion – when alien species are introduced unintentionally or deliberately some of them turn invasive and cause decline or extinction of indigenous species. I. Nile Perch – In Lake Victoria in East Africa Nile Perch caused extinction of 200 species of cichlid fish.</p> <p>II. <i>Lantana</i> and <i>Eichhornia</i> – Caused environmental damage and threat to native species.</p> | <p>1</p> <p>1</p> <p>½</p> | |

III. *Clarias gariepinus* – African catfish introduced for aquaculture purposes poses a threat to indigenous catfishes in our rivers.

1/2

(ii) Regions with high levels of species richness, high degree of endemism have been declared as biodiversity hotspots to conserve biodiversity.

1/2+1/2

In India – Indo-Burma , Himalaya ,Western Ghats and Sri Lanka

(Any two regions)

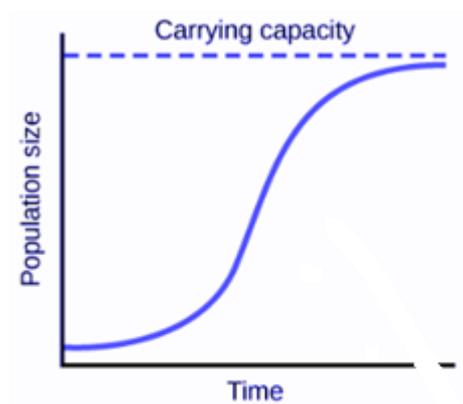
1/2+1/2

OR

(b) (i)
$$dN/dt = rN \left[\frac{K - N}{K} \right]$$

1

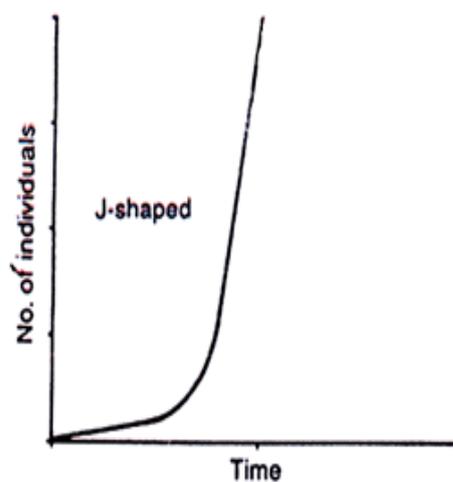
(ii)



Sigmoid growth curve

1

(iii)



J-shaped growth curve

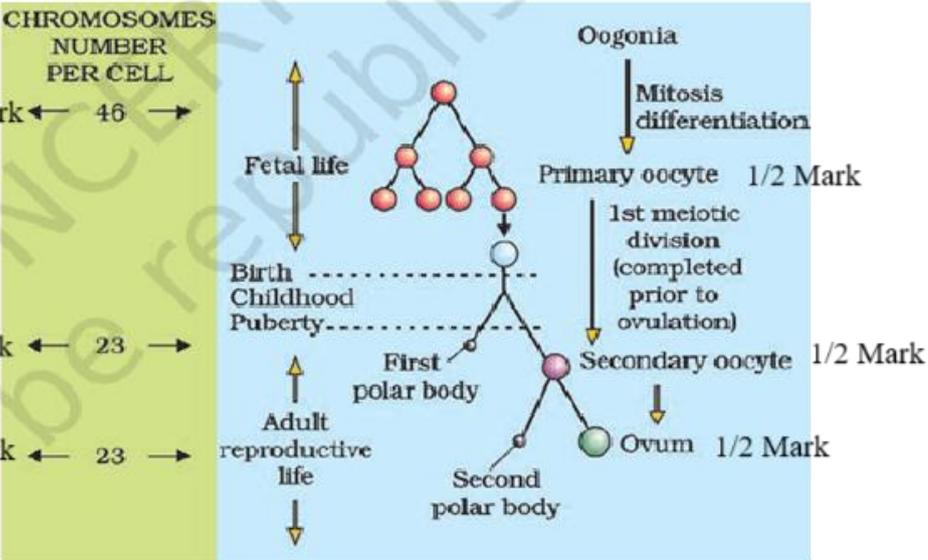
1

(iv)

-Logistic Growth curve / Sigmoid growth curve is more realistic
 -A given habitat in nature has enough resources to support a maximum possible number beyond which further growth is not possible/ resources become limiting factor

1+1

5

| | | | |
|-----|--|---------------------------------|---|
| 32. | <p>(a)</p> <ul style="list-style-type: none"> • Right – Compatible Wrong – Incompatible • Two-celled pollen grain on the stigma germinates to form pollen tube through germ pore, generative cell divides and forms the two male gametes during the growth of pollen tube in the stigma, pollen tube enters ovule through micropyle then enters one of the synergids through the filiform apparatus, pollen tube releases two male gametes, one male gamete(n) fuses with egg cell(n) to form zygote (2n) thus completing syngamy, other male gamete fuses with polar nuclei in central cell to form primary endosperm nucleus (3n) termed triple fusion. • Involves pollen recognition , Promotion or inhibition of (formation of pollen tube) the pollen. <p style="text-align: center;">OR</p> <p>(b) (i)</p> | 1/2 1/2 | |
| |  <p style="text-align: center;">Oogenesis in Female Human (Representation with correct labelling and ploidy)</p> <p>(ii)</p> <ol style="list-style-type: none"> (I) Formation of corpus luteum – Ovary (II) Maturation of tertiary follicle – Ovary (III) Fertilisation – Ampullary region of oviduct (IV) Implantation – Endometrium of uterus | 1/2x6 1/2x2 1/2x6 | 5 |
| 33. | <p>(a)</p> <ul style="list-style-type: none"> -It should be able to generate its replica. -Be chemically and structurally stable. -Provide scope for slow changes(mutation) required for evolution. -Able to express itself in the form of ‘Mendelian Characters’. | 1/2x4 | |

| | | | |
|---|---|----------|--|
| <p>DNA is double-stranded whereas RNA is single-stranded, DNA has thymine instead of uracil which is present in RNA and thus DNA is more stable, DNA has 2'-H group whereas RNA has 2'-OH group at every nucleotide which is reactive and easily degrades RNA, RNA is also catalytic, both RNA and DNA can mutate but RNA mutates faster than DNA.</p> <p style="text-align: right;">(Any Two)</p> <p>Based on above points DNA molecule is preferred as an ideal genetic material .</p> <p style="text-align: center;">OR</p> <p>(b)</p> <p>(i)</p> <p>Polygenic Inheritance-Inheritance of a trait that is controlled by three or more genes / the phenotype reflects contribution of all alleles (three or more) and effect of each allele is additive.</p> <p>Pleiotropy – When a single gene shows multiple phenotypic expressions.</p> <p>(ii)</p> <p>Dominance – In heterozygous pair of gene dominant allele is expressed over the recessive allele/ F1 progeny resemble either of the two parents which is dominant.</p> <p>Codominance – In a pair of genes when both alleles express themselves/ F1 generation(one of the progeny) resembles both the parents.</p> <p>Incomplete dominance – When in heterozygous state none of the allele is able to express itself and phenotype is in between/ Phenotype of F1 progeny is in between the two parent.</p> <p>Correct differences explained with the help of cross to be evaluated</p> | <p>1x2</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> | <p>5</p> | |
|---|---|----------|--|

