Confidential
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Senior School Certificate Examination

March 2016

Marking Scheme - Biology (Theory)

Expected Answers/Value Points

General Instructions :

The Marking Scheme and mechanics of marking

1 In the marking scheme the marking points are separated by commas, one oblique line (/) indicates acceptable alternative, two obliques (//) indicate complete acceptable alternative set of marking points.

2. Any words/phrases given within brackets do not have marks.

3. Allow spelling mistakes unless the misspelt word has another biological meaning. Ignore plurals unless otherwise stated in the marking scheme.

4. In any question exclusively on diagram no marks on any description. But in questions on descriptions, same value points may be marked on the diagrams as a subsitute.

5. All awarded marks are to be written in the left hand margin at the end of the question or its part.

6. Place a tick (✓) in red directly on the key/operative term or idea provided it is in correct context. Place "Half-tick" ½ wherever there is ½ mark in the marking scheme. (Do not place tick indiscriminately just to show that you have read the answer).

7. If no marks are awarded to any part or question put a cross (×) at incorrect value portion and mark it zero (<u>in words only</u>).

8. Add up ticks or the half ticks for a part of the question, do the calculation if any, and write the part total or the question total in the left hand margin.

9. Add part totals of the question and write the question total at the end. Count all the ticks for the entire question as a recheck and draw a circle around the question total to confirm correct addition.

10. If parts have been attempted at different places do the totalling at the end of the part attempted last.

11. If any extra part is attempted or any question is reattempted, score out the last one and write "<u>extra</u>".

12. In questions where only a certain number of items are asked evaluate only that many numbers in sequence as is asked ignoring all the extra ones even if otherwise correct.

13. Transcribe the marks on the cover page. Add up question totals. Recheck the script total by adding up circled marks in the script.

14. Points/answer given in brackets in marking scheme are not so important and may be ignored for marking.

Question Paper Code 57(B)

SECTION A

Q.Nos. 1 - 5 are of one mark each

1. State the purpose for carrying emasculation in breeding experiments.

Ans. To prevent self pollination

[1 mark]

2. Write Erwin Chargaff's observation with respect to DNA molecule structure.

Ans. In a double stranded DNA the ratio between Adenine and Thymine , Guanine and Cytosine are constant and equal // $[A+G] = [T+C]$ // $\frac{[A+G]}{[T+C]} = 1$

[½ + ½ = 1 mark]

3. State what is a large change in allele frequency in a sample of a new population indicative of ?

Ans. Evolution / formation of new species / speciation

[1 mark]

4. How is a bacterial cell made 'competent' to take up DNA ?

Ans. Treating it with a specific concentration of a bivalent cation (calcium) , giving heat shock followed by incubating the cell with recombinant = ½ + ½

[1 mark]

5. Why are snow-leopards not found in Kerala forests ?

Ans. Not adapted to hot and humid / tropical climate of Kerala

[1 mark]

SECTION - B

Q.Nos. 6 - 10 are of two marks each

6. List in sequence the stages of oogenesis in a human female from its foetal life to birth.

Ans.

Foetal life ↓ Birth

Oogonia = ½
↓ Mitosis & differentiation
Primary Oocyte = ½
↓ Meiosis - I = ½
completed upto prophase - I = ½

[2 marks]

7. How did Darwin and de Vries differ in their views on Evolution ?

Ans. Evolution for Darwin was gradual , de Vries said mutation caused speciation / saltation (single step large mutation) = 1 + 1

[2 marks]

8. (i) Write the scientific name of the vector that is responsible for the spread of dengue.

(ii) Write any two precautions that must be taken to check the spread of this disease.

Ans. (i) *Aedes(aegypti)* mosquito = 1

(ii) Avoiding stagnation of water in and around inhabited areas , regular cleaning of household coolers , use of mosquito net , spraying insecticides in ditches , drainage areas and swamps = ½ × 2

(Any two)

[1 + 1 = 2 marks]

OR

(i) Write the cause of AIDS.

(ii) How does the transmission of the disease causing agent occur ?

Ans. (i) Infection with Human Immuno Deficiency Virus / HIV infection = 1

(ii) - Unprotected sexual contact with infected person

- Transfusion of contaminated blood

- Sharing infected needles

- From infected mother to child through placenta

(Any two) = ½ + ½

[1 + 1 = 2 marks]

9. Write two high yielding varieties of wheat along with their characteristic features

Ans. Sonalika , Kalyan sona (Any other HYV) = ½ × 2

semi dwarf variety , disease resistant = ½ × 2

[2 Marks]

10. How do the following organisms overcome the stressful external conditions ?

(i) Bacteria

(ii) Snail

(iii) Bear

(iv) Zooplankton in lakes.

Ans. (i) Thick walled spore are formed = ½

(ii) Aestivation = ½

(iii) Hibernation = ½

(iv) Diapause = ½

[½ × 4 = 2 marks]

SECTION - C

Q.Nos. 11 - 22 are of three marks each

11. Name the following that form the parts of a typical angiosperm ovule :

(i) The stalk that attaches it to the placenta in the ovary.

(ii) The layers that protect it. The mass of tissue enclosed by these layers.

(iii) The different types of cells present in its mature embryo sac.

Ans. (i) Funicle = ½

(ii) Integuments , nucellus = ½ + ½

(iii) Egg cell , synergids , antipodals , central cell

All four cells = ½ × 3 , if three cells mentioned = 1

OR

List the different parts of a typical dicotyledonous embryo along with their functions.

Ans. - (Two) Cotyledons , stores food / protection = ½ + ½

- Hypocotyl / Radicle , forms root = ½ + ½

- Epicotyl / Plumule , forms stem / shoot = ½ + ½

12. (a) Why are some seeds called albuminous and others non-albuminous ?

(b) Which one of the following are albuminous or exalbuminous :

(i) Pea **(ii) Wheat**

(iii) Groundnut **(iv) Maize**

Ans. (a) Non - albuminous - No residual endosperm after seed maturation

Albuminous -Retain a part of the endosperm after seed formation = ½ × 2

(b) Exalbuminous - Pea , Groundnut = ½ × 2

Albuminous - Maize , Wheat = ½ × 2

[1 + 2 = 3 marks]

13. (i) How many true - breeding lines did Mendel select in pea plants for his experiments ?

(ii) What is a true - breeding line ?

(iii) Give two examples of contrasting traits studied by Mendel.

Ans. (i) Fourteen =1

(ii) When all characters are similar except for one character / self pollination continues for several generations to form homozygosity or stable trait = 1

(iii) Tall and Dwarf plants , Round and Wrinkled seeds / Violet and White flowers / Axial and Terminal flowers / Inflated(full) and Constricted pods / Yellow and Green pods / Yellow and Green seeds

(Any two) = ½ + ½

[1 + 1 + 1 = 3 marks]

14. ABO blood groups are a good examples that show two deviations of Mendelian pattern of inheritance. Write the two deviations seen giving explanation for each.

Ans. I^A - I^B and i / Three alleles (in place two alleles) , control the formation of ABO blood groups , this is multiple allelism (deviation from Mendelian pattern) = ½ × 3

I^A and I^B are two dominant alleles ,which are expressed together in AB blood group , this is co dominance (deviation from Mendelian pattern)= ½ × 3

[3 Marks]

15. Explain sex - determination in humans.

Ans. In humans sex chromosomes / the 23rd pair of chromosomes in male is XY , female it's XX , (during gamete formation) male produces two types of gametes (sperms) 22 + X and 22 + Y , female produces only one type of gamete (ovum) 22 + X , if sperm with X fuses with female gamete female child is born , sperm with Y fuses with female gamete male child is born = ½ × 6

[3 Marks]

16. (i) Name the two hosts in the life cycle of Plasmodium. In which one does fertilisation of Plasmodium occur ?

(ii) Name the disease caused by this parasite and how is it transmitted ?

Ans. (i) Human , female Anopheles mosquito - two hosts = ½ × 2
Fertilisation occurs in the gut / stomach of mosquito = ½

(ii) Malaria , = ½
When infected (female) mosquito , bites a healthy person = ½ × 2

[1½ + 1½ = 3 marks]

17. Why is primary treatment of sewage required ? Explain.

Ans. Sewage contains huge amount of large and small particulate debris , that needs to be removed / separated from the effluent , before it is taken for secondary treatment = 1 × 3

[3 Marks]

18. (i) How was the first recombinant DNA constructed ? Explain the process.

(ii) Who constructed it ?

Ans. (i) Isolated antibiotic resistant gene , from the plasmid of a bacteria , that are resistant to antibiotic, linked this gene with the plasmid of *salmonella typhimurium* = ½ × 4

(ii) (Stanley) Cohen , (Herbert) Boyer = ½ + ½

[2 + 1 = 3 Marks]

19. One of the best known applications of biotechnology is the production of pest resistant plants. How is this achieved in Bt Cotton ?

Ans. *Bacillus thuringiensis* produces crystals which contain insecticidal protein , Bt toxin exists as inac tive protoxin but once an insect ingests it the inactive toxin is converted to active form , due to al kaline pH of the gut which solubilise the crystals , activated toxin binds to the surface of midgut epithelial cells , and create pores , (that cause swelling and lysis) and death of insect = ½ × 6

[3 Marks]

20. If a person is born with a hereditary disease, can a corrective therapy be taken ? Explain with an example.

Ans. Yes (by gene therapy) = ½

Gene therapy is a collection of methods that allows correction of a gene defect that has been diagnosed in a child / embryo , it involves insertion of a normal gene into person's cells to compensate non - functional gene , Example - a four year old girl treated for ADA deficiency , by introducing a

functional ADA cDNA in lymphocytes taken out from the blood of patient and grown in culture , these cells were subsequently returned to the patient = ½ × 5

[3 Marks]

21. Name the interaction where both the species benefit. Explain this interaction with plant animal relationship that involves co-evolution.

Ans. Mutualism = ½.

(A given) Fig species can be pollinated only by its partner wasp species and no other species , the female wasp uses the fruit not only as an ovi position (egg laying) site , but uses the developing seeds within the fruits for nourishing its larvae, the wasp pollinates the fig inflorescence while searching for suitable egg laying sites , evolution of the fig and the pollinator are tightly linked to one another = ½ × 5

[3 Marks]

22. How is an algal bloom formed in a water body ? Explain the affect it has on the water body.

Ans. Presence of large amount of nutrients in water , causes excessive growth of plankton (free floating) algae = ½ + ½

Causes deterioration of water quality , and fish mortality , some bloom forming algae are extremely toxic to humans and animals , imparts distinct color to water bodies = ½ × 4

[1 + 2 = 3 Marks]

SECTION - D

Q.No. 23 is of four marks

23. (a) The Government has hailed the practice of Yoga. Your school is organising a yoga camp. Make a list of four benefits of this practice.

(b) Write two slogans for promoting yoga camp in your school.

Ans. (a) Physical health , Mental health , yoga makes you feel active / energetic , and positive or any other relevant benefit = ½ × 4

(b) Yoga - A need for today

Yoga - A balanced way of life = 1 × 2

(Any other suitable slogan to be evaluated as 1 × 2)

[2 + 2 = 4 marks]

SECTION - E

Q.Nos. 24- 26 are of five marks each

24. Write the special adaptations that are found in plants pollinated by wind. Give an example of an aquatic plant pollinated by wind and a land plant pollinated by wind.

Ans. - Pollen grains are light

- Pollen grain are non-sticky
- Well exposed stamens
- Large feathery stigma
- Single ovule in each ovary

- Numerous flowers in an inflorescence
- Flowers do not produce nectar
- Flower are non colourful
- Flower produces enormous amount of pollen

(Any six) ½ × 6

Aquatic plant pollinated by wind e.g. water hyacinth / water lily = 1

Land plant pollinated by wind e.g. grasses / corn cob / maize = 1

[5 marks]

OR

(a) From day 1 to day 28 of the menstrual cycle, in humans, name the phases, from :

(i) day 1 to day 5

(ii) day 6 to day 14

(iii) day 15 to day 28, -

Comment on changes that occur from day 15 to day 28.

(b) Name the pituitary harmones that influence this cycle.

Ans. (a) (i) Day 1 -5 = Menstruation = ½

(ii) Day 6 -14 = Proliferative phase / follicular phase = ½

(iii) Day 15 - 28 = Luteal phase / secretary phase = ½

After day 15 when ovulation occurs the remaining parts of the graafian follicle transforms as corpus luteum , the corpus luteum subsequently secretes large amounts of progesterone , which is essential for maintenance of endometrium which in turn is responsible for implantation of fertilised ovum and other events of pregnancy (if fertilisation occurs) , in the absence of fertilisation the corpus luteum degenerates , this causes disintegration of endometrium leading to menstruation = ½ × 5

(b) FSH and LH = ½ + ½

[4 + 1 = 5 marks]

25. Explain the process of transcription in Prokaryotes.

Ans. There is a single DNA dependent RNA polymerase that catalyses transcription of all types of RNA , RNA polymerase binds to promoter and initiates transcriptions (initiation) , it uses nucleoside triphosphates - as substrates and polymerises in a template dependent fashion following the rule of complementarity , it somehow also facilitates opening of helix and continues elognation , only a short stretch of RNA remains bound to the enzyme , once the polymerase reach the terminator region , the nascent RNA falls off , so also the RNA polymerase , which results in termination of transcription, since RNA polymerase is only capable of catalysing the process of elongation it associates transiently with initiation factor (σ) and the termination factor (ρ) to initiate and terminate the transcription respectively = ½ × 10

[5 marks]

OR

How does comparative anatomy and morphology act as an evidence for Evolution ? Explain with the help of suitable examples.

Ans. - Comparative Anatomy or Morphology shows similarities and differences among organisms of today and those that existed many years ago = ½

- Such similarities can be interpreted to understand whether common ancestors were shared or not = ½

Homologous organ - Anatomically similar but different function , they indicate common ancestry = ½ + ½

eg - Any two or more forelimbs of mammals (flipper of whale , forelimbs of cheetah , forelimb of man , wings of bat) / heart of vertebrates / brain of vertebrates = ½

- Thorns of Bougainvillea and tendrils of cucurbits = ½

Analogous organ - Anatomically different but same function = 1

e.g. - wings of bat and wings of birds / flippers of penguin and dolphin / eye of octopus and mammals = ½

- Sweet potato root and potato tuber = ½

[5 marks]

26. (i) Describe growth pattern of a population growing in a habitat with limited resources.

(ii) Name the type of curve that is formed for this kind of growth.

Ans. (i) A population growing in a habitat with limited resources initially shows a lag phase = 1

followed by phase of acceleration , = 1

and deceleration and finally an asymptote , = 1

when population density reaches the carrying capacity = 1

(ii) Sigmoid curve / logistic growth = 1

[4 + 1 = 5 marks]

OR

(a) Describe the Hydrarch succession.

(b) Differentiate between primary and secondary succession in water.

Ans. a) Pioneer species in water are phytoplanktons, replaced by submerged plant stage / free floating , ⟶ Reed Swamp , ⟶ Marsh meadow , ⟶ scrub , ⟶ forest = ½ × 6

b)

Primary Succession	**Secondary Succession**
- Occurs in bare areas / succession starts in the areas where no living organisms ever existed	- Begins in areas where natural biotic communities have been destroyed
- It takes several hundred to several thousand years to reach climax communities	- Climax reached more quickly

(Any two differences) = 1 + 1

[3 + 2 = 5 marks]