

**Senior School Certificate Examination**  
**COMPARTMENT (2015)**  
**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 substitute.
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 (x) at incorrect value portion and mark it zero (in words only).
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 “extra”.
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.

Set III

Section A

Q nos 1-5 are of one mark each

**Q1. On what basis is the skin colour in humans considered polygenic?**

Ans. Controlled by more than one gene , cumulative/additive effect of every gene  $\frac{1}{2} + \frac{1}{2}$

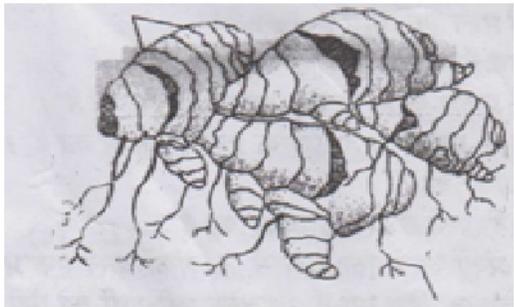
**Q2. How is lactic acid bacteria beneficial to us other than helping in curdling the milk ?**

Ans. Innoculum contains lactobacilli which curdles milk into curd with lactic acid 1

**Q3. Why Western Ghats in India have been declared as biological hot-spots ?**

Ans. Due to greater species diversity/ presence of endemic species 1

**Q4.**



**Identify the picture and mention the vegetative part that helps it to propagate.**

Ans. Rhizome of ginger/ underground stem, axillary bud grows from the node  $\frac{1}{2} + \frac{1}{2} = 1$

**Q5. Write the chromosomal defect in individuals affected with Klinefelter's syndrome.**

Ans. (Male) additional copy of X chromosome / XXY 1

**Section –B**

Q nos 6-10 are of two marks each

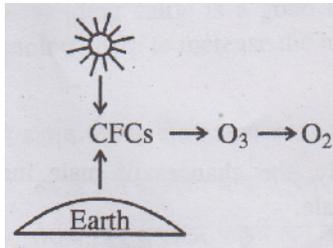
**Q6. (a) cry 1AC gene.**

**(b) RNA interference (RNAi)**

Ans. (a)It produces inactive pro-toxin in the host cell /produces proteins to control cotton bollworm

(b) It produces ds RNA which silences host mRNA/cellular defence mechanism/prevent infestation by nematodes 1+1

Q7.



(a) Expand CFC.

(b) How does it reduce ozone to oxygen ?

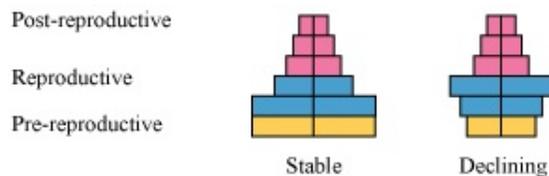
Ans. a) Chlorofluorocarbons

b) It releases Chlorine atoms which degrades ozone to release oxygen

1+1

Q8. Draw labelled diagrams of stable and declining age pyramids of human population.

Ans.



Labelling- Pre-reproductive , reproductive, Post-reproductive ,correct diagram

$\frac{1}{2} \times 4 = 2$

Q9. What happens to corpus luteum in human female if the ovum is (i) fertilized, (ii) not fertilized?

OR

Write the difference between the tender coconut water and the thick, white kernel of a mature coconut and their ploidy.

Ans. i) Corpus luteum continues to secrete progesterone to maintain pregnancy/ it persists and produces progesterone

ii) it disintegrates/ changes into corpus albicans

1+1

OR

Coconut water from the tender coconut has free nuclear endosperm, kernel has the cellular endosperm  
Ploidy of the endosperms-  $3n$ / Triploid  $\frac{1}{2} + \frac{1}{2} + 1 = 2$

Q10. Name the first human like hominid. Mention his food habit and brain capacity.

Ans. *Homo habilis*

1

Did not eat meat / vegetarian, brain capacity 650-800cc

$\frac{1}{2} + \frac{1}{2}$

Section -C

Q nos 11-22 are of three marks each

Q11. (a) Differentiate between benign and malignant tumours.

(b) Why is colostrum a boon to the newborn baby ?

Ans. (a) Benign tumour- remains confined to original location/does not spread to other part of the body/ not cancerous 1

Malignant tumour-mass of proliferating (neoplastic) cells that invade and damage surrounding tissues/cancerous tumour/ tumour showing property of metastasis 1

(b) Colostrum contains antibodies/that provides resistance (immunity) to new born babies 1

**Q12. What is ecological succession ? Where and why would the rate of succession be faster in newly created pond or a forest destroyed by a forest fire ?**

Ans. Gradual/predictable change in the species composition of a given area,

Rate of succession would be faster in a forest destroyed by a forest fire,

Such disturbances create new conditions that encourage some species and discourage or eliminate other species /since after a forest fire some soil is already present and succession is faster than primary succession

1 x 3 = 3

**Q13. If there is a history of haemophilia in the family, the chances of male members becoming haemophilic are more than that of the female.**

(a) Why is it so?

(b) Write the symptoms of the disease.

Ans. a) Defective gene is on X chromosome, in case the carrier female (mother) passes  $X^h$  to the son he suffers, if she passes  $X^h$  to the daughter, she has the other X( from father ) to make it heterozygous so the daughters escape as carriers  $\frac{1}{2} \times 4 = 2$

b) The blood does not clot in the affected person after an injury or a small cut. 1

**Q14.. (a) Differentiate between exons and introns.**

(b) What is a plasmid ?Why is it selected as a vector ?

Ans. a) Exons are the coding or expressed sequences that appear in mature or processed RNA, introns are intervening sequences that do not appear in mature or processed RNA//Exons are codons that code for amino acid sequence, introns do not code for amino acids 1

b) Autonomously replicating circular DNA / extra chromosomal DNA,exclusively present in bacteria  $\frac{1}{2} + \frac{1}{2}$

It takes in alien DNA/acts as vector, and delivers is into a host cell  $\frac{1}{2} + \frac{1}{2}$

**Q15. How does the study of fossils support evolution ?. Explain.**

**OR**

**What does Hardy-Weinberg Principle of equilibrium indicate ? List any two factors that could alter the equilibrium. What would such an alteration lead to ?**

Ans. Fossils are remains/ hard parts of life forms, found in sedimentary rocks, some of them appear similar to modern organisms /some represent extinct organisms, study of fossils in different sedimentary layers indicates the geological period in which they existed ( provide palaeontological evidence)

1 x 3

**OR**

(a) Allele frequencies are stable and constant from generation to generation /the gene pool (total genes and their alleles in a population) remains a constant/ sum total of all allelic frequencies is one 1

(b) Factors– Gene migration, gene flow, genetic drift, mutation, genetic recombination, natural selection (any two  $\frac{1}{2} + \frac{1}{2}$  )

Leads to –Evolution

1

**Q16. At what stage does Plasmodium gain entry into the human body ? Write the different stages of its life cycle in the human body.**

Ans. Anopheles picks up gametocytes from the person with malarial fever, gametocytes develop in the RBCs, fertilisation in the mosquito, zygote develop in the wall of intestine, sporozoites develop and migrate to the salivary glands, to be injected into the next victim by the mosquito  $\frac{1}{2} \times 6 = 3$

**Q17. State the functions of the following in the cloning vector pBR322:**

**(i) Ori, (ii) rop, and (iii) Hind III sites\**

Ans. i) Ori-sequence from where replication starts/ responsible for controlling the copy number of the linked DNA 1

ii) Rop- codes for proteins involved in the replication of the plasmid 1

iii) Hind III - Restriction site on E. coli cloning vector 1

**Q18. High yielding cattle is a good solution for food enhancement. How does the MOET technology help to increase the herd size ?**

Ans. High yielding female administered with FSH ,6-8 eggs / multiple eggs produced, inseminated, fertilised eggs recovered non-surgically, at 32-cell stage , transferred to surrogate mother (for development)  $\frac{1}{2} \times 6 = 3$

**Q19. Explain the events in a normal woman during her menstrual cycle on the following days:**

**(a) Pituitary hormone levels from 8 to 12 days.**

**(b) Uterine events from 13 to 15 days.**

**(c) Ovarian events from 16 to 23 days.**

Ans. a) FSH and LH levels–low 1

b) Endometrium is highly vascularised / proliferative phase of uterine lining 1

c) Formation of corpus luteum / secretion of progesterone 1

**Q20. Drinking water problem in our urban areas is caused mainly because we fail to protect our water bodies. Explain how accelerated eutrophication chokes our water bodies to death.**

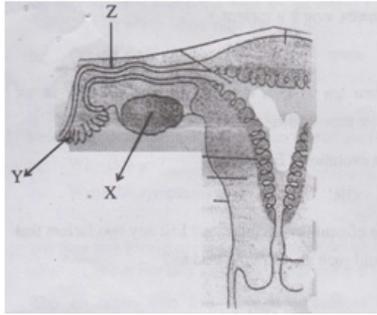
Ans. Sewage and industrial wastes are added to the lake, nitrates and phosphates act as plant nutrients, promotes algal bloom, dissolved oxygen depletes, less oxygen and pollutants poison the aquatic life , decomposing remains choke the lake to death.  $\frac{1}{2} \times 6 = 3$

**Q21. What is 'predation' ? Explain with the help of suitable examples why is it required in a community with rich biodiversity.**

Ans. Transfer energy from one trophic level to the next , keeps the prey population under control, biological control, helps maintain species diversity.  $1\frac{1}{2}$

Same points explained with the help of an example  $1\frac{1}{2}$

Q22.



This diagram above shows a part of the human female reproductive system.

- (a) Name the gamete cells that would be present in 'X' if taken from a newborn baby.  
(b) Name 'Y' and write its function.  
(c) Name 'Z' and write the events that take place here.

Ans. (a) X= Primary oocytes

1

(b) Y= Fimbriae, collection of ovum

$\frac{1}{2} + \frac{1}{2}$

(c) Z=ampullary- isthmic junction/fallopian tube, the ovum encounters the sperm/fertilisation takes place

$\frac{1}{2} + \frac{1}{2}$

#### Section –D

Q no 23 is of four marks

**Q23. Peer pressure plays a negative role in triggering smoking habits in adolescents. As a school captain list any two activities you would like to organize with the help of senior students of your school and any other two activities you would like your school authorities to organize for the students to tackle this problem. Explain how these activities Will help in doing so.**

Ans. Students' activities- Poster making , slogan writing , essay writing , processions , display of banners , highlighting its ill- effects during assembly, power-point presentation on harmful effects of tobacco

(any two=  $\frac{1}{2} + \frac{1}{2}$ )

School activities – Seminars, workshops, talks-by doctors, counsellors ,psychologists, government officials, vigilant supervision, value education through class teachers

(any two=  $\frac{1}{2} + \frac{1}{2}$ )

This will help in bringing about awareness/ prevent diseases associated with smoking /provide alternatives/help the smokers in doing away with this habit(Any other relevant point to be evaluated)

(any two =1+1)

#### Section –E

Q nos 24- 26 is of five marks each

**Q24. Explain the application of rDNA technology to produce insulin.**

**OR**

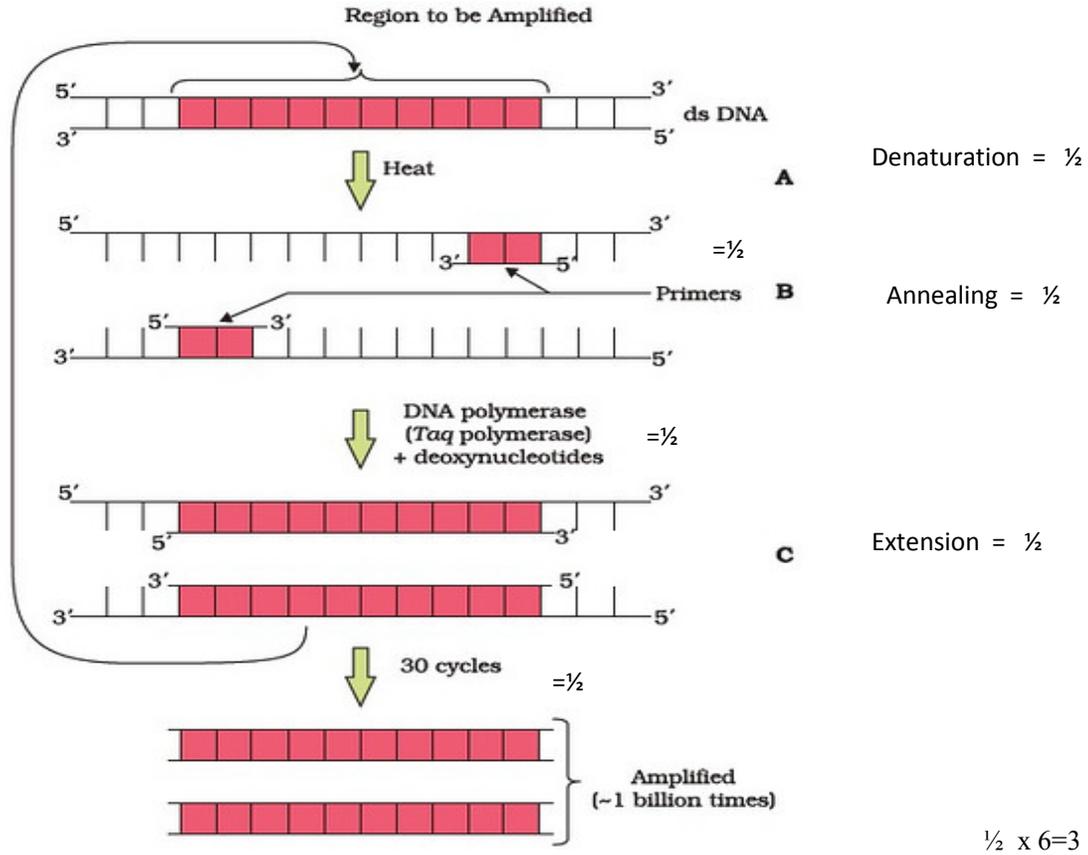
**(a) Describe the different steps in one complete cycle of PCR.**

**(b) State the purpose of such an amplified DNA sequence.**

Ans. Human insulin is synthesised as a pro- hormone, the pro-hormone contains an extra C- peptide, the C-peptide is not present in mature insulin, and is removed during maturation, Eli-Lily-an American company prepared two DNA sequences, corresponding to A and B chains of human insulin, and introduced them in plasmids of E.coli to produce insulin chains, Chain A and B were produced separately, extracted and combined, by creating disulphide bonds

$\frac{1}{2} \times 10 = 5$

OR



(Same value points to be awarded in an explanation)

Purpose –used to ligate with a vector for further cloning/ detection of bacteria or virus by amplification of their DNA/detection of HIV in AIDS patient/to detect mutation in genes in suspected cancer patients. (any two= 1+1)

Q25. (a) Describe in sequence the process of microsporogenesis in angiosperms.

(b) Draw a labelled diagram of a two celled final structure formed.

OR

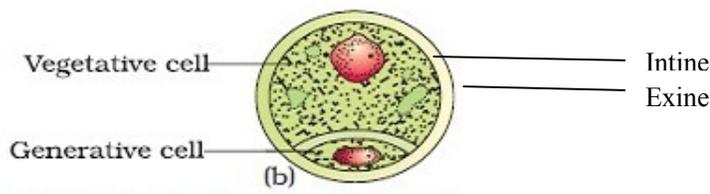
(a) Draw a sectional view of a seminiferous tubule of human. Label sertoli cell, spermatogonia and leydig cell on it and write their functions.

(b) Explain the role of pituitary and sex hormones in the process of spermatogenesis.

Ans. Microsporogenesis-Each microspore mother cell divides meiotically, to form 4 haploid cells or tetrad, each microspore divides into two unequal cells- large vegetative cell and smaller generative cell; at this 2-celled stage the pollen grains are shed. Sometimes the generative cell divides mitotically to give rise to two haploid male gametes, that are shed at 3 - celled stage

1/2 x 6=3

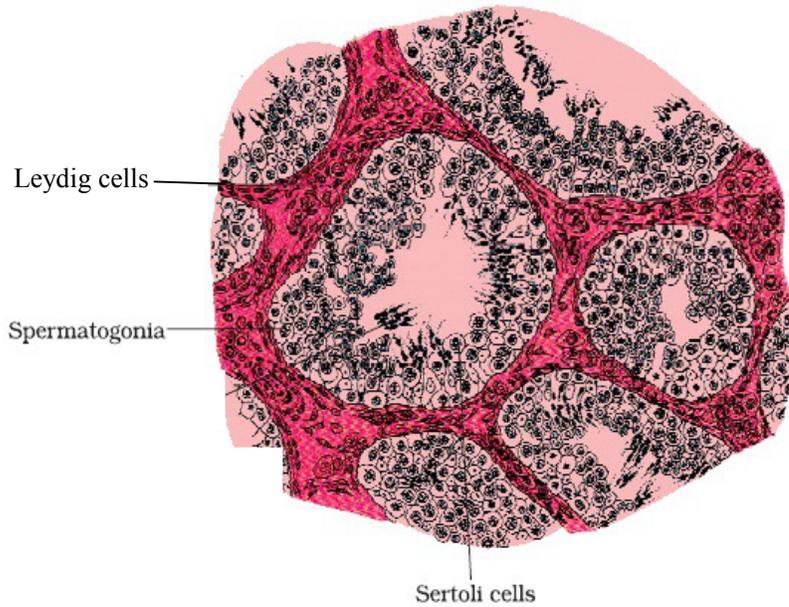
b)



Labelling –exine, intine, vegetative cell, generative cell

1/2 x 4=2

OR



Label sertoli cells, spermatogonia, Leydig cells

$\frac{1}{2} \times 3 = 1 \frac{1}{2}$

Functions –Sertoli cells -secrete factors which help in the process of spermiogenesis/ provide nutrition to germ cells

$\frac{1}{2}$

Spermatogonia-divide to produce spermatids /sperms

$\frac{1}{2}$

Leydig cells-synthesis or secretion of androgens/testosterone

$\frac{1}{2}$

b) Pituitary hormones– LH/luteinising hormone- acts on Leydig cells and stimulates synthesis and secretion of androgens,

FSH/follicle stimulating hormone- acts on sertoli cells and stimulates secretion of some factor that help in spermiogenesis

$\frac{1}{2} + \frac{1}{2}$

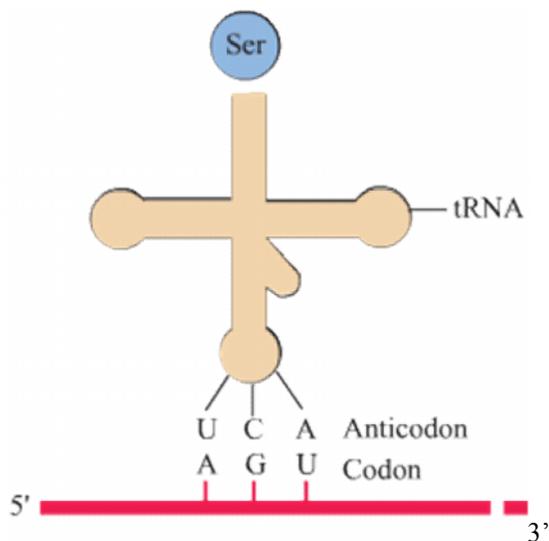
Sex hormone –(Androgen/testosterone) stimulate process of spermatogenesis

**Q26. Explain the structure of t-RNA with the help of a diagram. Describe its role in the process of translation.**

OR

**A pea plant producing yellow coloured and round seeds is given with unknown genotypes. Explain how you would find the correct genotypes of the plants with respect to the two traits mentioned. Work out the cross and name it.**

Ans.



Correct diagram-1, correct labelling of anti-codon / anti- codon site  $\frac{1}{2}$  , correct labelling of corresponding amino acid / amino acid binding site-  $\frac{1}{2}$

t-RNA has an anticodon loop that has bases complementary to the code ,and it has also an amino acid acceptor end to which it binds to amino acid . 1

Amino acid are activated in the presence of ATP, and linked to their cognate t-RNA,called as charging/ amino-acylation of t-RNA. 1

Initiator t-RNA recognises start codon (AUG)/ t-RNA act as the adapter molecule that reads the genetic code 1

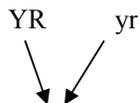
Two such charged t-RNA are brought close enough to favour peptide bond formation.  $\frac{1}{2} \times 6=3$

**OR**

Test Cross = 1

**Case 1**

YYRR x yyrr

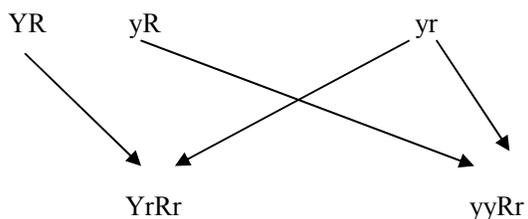


YyRr

If all phenotypes yellow and round then parent is YYRR 1

**Case2**

YyRR x yyrr

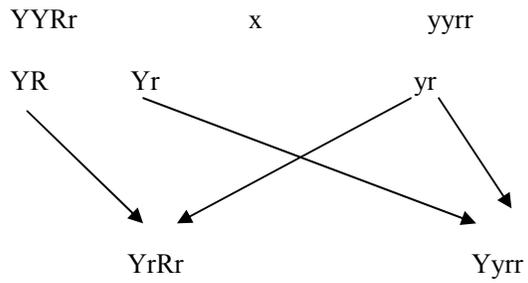


Phenotype: 1 Yellow round and 1 Green round

Then parent is YyRR

1

**Case 3**

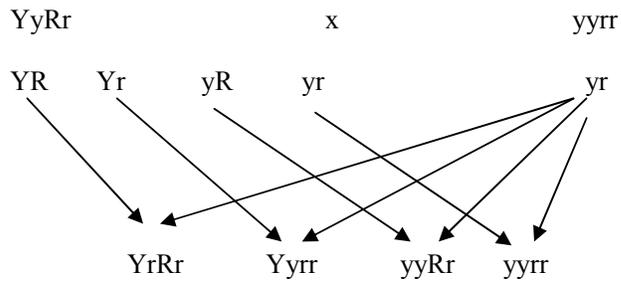


Phenotype: 1 Yellow round and 1 Yellow wrinkled

Then parent is YYRr

1

**Case 4**



Phenotype: 1 Yellow round and 1 Yellow wrinkled and 1 Green round and 1 Green wrinkled

Then parent is YyRr

1