Strictly Confidential: (For Internal and Restricted use only)
Senior School Certificate Examination-2020
Marking Scheme – BIOLOGY (SUBJECT CODE - 044)
(PAPER CODE – 57/2/1,2,3)

General Instructions: -

1. You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully.**Evaluation is a 10-12 days mission for all of us. Hence, it is necessary that you put in your best efforts in this process.**
2. Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one's own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed. **However, while evaluating, answers which are based on latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and marks be awarded to them.**
3. The Head-Examiner must go through the first five answer books evaluated by each evaluator on the first day, to ensure that evaluation has been carried out as per the instructions given in the Marking Scheme. The remaining answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
4. Evaluators will mark(√) wherever answer is correct. For wrong answer 'X"be marked. Evaluators will not put right kind of mark while evaluating which gives an impression that answer is correct and no marks are awarded. **This is most common mistake which evaluators are committing.**
5. If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totaled up and written in the left-hand margin and encircled. This may be followed strictly.
6. If a question does not have any parts, marks must be awarded in the left-hand margin and encircled. This may also be followed strictly.
7. If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out.
8. No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
9. A full scale of marks 0-70 has to be used. Please do not hesitate to award full marks if the answer deserves it.
10. Every examiner has to necessarily do evaluation work for full working hours i.e. 8 hours every day and evaluate 20 answer books per day in main subjects and 25 answer books per day in other subjects (Details are given in Spot Guidelines).
11. Ensure that you do not make the following common types of errors committed by the Examiner in the past:-
    - Leaving answer or part thereof unassessed in an answer book.
    - Giving more marks for an answer than assigned to it.
    - Wrong totaling of marks awarded on a reply.

- Wrong transfer of marks from the inside pages of the answer book to the title page.
- Wrong question wise totaling on the title page.
- Wrong totaling of marks of the two columns on the title page.
- Wrong grand total.
- Marks in words and figures not tallying.
- Wrong transfer of marks from the answer book to online award list.
- Answers marked as correct, but marks not awarded. (Ensure that the right tick mark is correctly and clearly indicated. It should merely be a line. Same is with the X for incorrect answer.)
- Half or a part of answer marked correct and the rest as wrong, but no marks awarded.

12. While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as cross (X) and awarded zero (0)Marks.

13. Any unassessed portion, non-carrying over of marks to the title page, or totaling error detected by the candidate shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.

14. The Examiners should acquaint themselves with the guidelines given in the Guidelines for spot Evaluation before starting the actual evaluation.

15. Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totaled and written in figures and words.

16. The Board permits candidates to obtain photocopy of the Answer Book on request in an RTI application and also separately as a part of the re-evaluation process on payment of the processing charges

SECTION A

1. Cleistogamous flowers are self-pollinated because

(A) they are bisexual flowers which do not open at all.

(B) they are bisexual and open flowers.

(C) they are unisexual.

(D) their stigma matures before the anthers dehisce.

Ans. (A) / Bisexual Flower which do not open at all

[1 Mark]

OR

Asexual reproduction by zoospores is observed in

(A) Penicillium

(B) Hydra

(C) Sponge

(D) Chlamydomonas

Ans. (D) / Chlamydomonas

[1 Mark]

2. The theory of evolution supported by the experiment conducted by Louis Pasteur is

(A) Spontaneous generation theory

(B) Life comes only from pre-existing life

(C) Abiogenesis of life

(D) Big bang theory

Ans. (B) / Life comes only from pre-existing life

[1 Mark]

3. The diagnostic test that confirms typhoid in humans is

(A) ELISA

(B) Widal

(C) MRI

(D) Amniocentesis

Ans. (B) / Widal

[1 Mark]

4. The bioactive molecule used as an immunosuppressive agent during organ transplant is

(A) Tetracyclin

(B) Cyclosporin-A

(C) Statin

(D) Streptomycin

Ans. (B) / Cyclosporin-A

[1 Mark]

OR

'Blue revolution' refers to

(A) construction of water dams for conservation of water

(B) production of fish in large quantities

(C) sewage treatment

(D) controlling algal bloom

Ans. (B) / Production of fish in large quantities

[1 Mark]

5. Which one of the following is *not* the product of transgenic experiments?

(A) Pest-resistant crop variety

(B) High nutritional value in grains

(C) Production of insulin by rDNA technique

(D) Drought-resistant crops

Ans. (No correct answer in the choices-Every one gets one mark)

[1 Mark]

SECTION –B

(Q Nos. 6-12 are of two marks each)

6. Write the ploidy and number of chromosomes in human (a) meiocytes, and (b) gametes.

Ans. (a) (meiocytes) 2n , 46 = ½ + ½

(b) (Gametes) n , 23 = ½ + ½

[2 Marks]

7. What is aneuploidy ? Name a chromosomal disorder in humans caused due to (a) gain of an autosome, and (b) loss of a sex chromosome in females.

Ans. Failure of segregation of chromatids (during cell division), resulting in gain or loss of a chromosome (s) = ½ + ½

(a) (Gain of an autosome) - Down's syndrome = ½

(b) (Loss of a sex chromosome) - Turner's syndrome = ½

[2 Marks]

8. State a functional difference between the following codons:

(a) AUG and UAA

(b) Specific and Degenerate

Ans. a. AUG – Start codon / codes for Methionine / Met , UAA- Stop / codon / Nonsense Codon / Does not code for any aminoacid / Terminator Codon / Ochre

b. Specific - one codon codes for one amino acid

Degenerate - one amino acid coded by more than one codon = ½ × 4

[2 Marks]

9. (a) Identify any *two* marsupials from the list given below :

(i) Lemur

(ii) Spotted cuscus

(iii) Flying phalanger

(iv) Bobcat

(v) Tasmanian wolf

(vi) Mole

(b) "Australian marsupials exhibit adaptive radiation." Justify the statement.

Ans. a. ii) / Spotted cuscus ,

iii) / Flying phalanger

v) / Tasmanian wolf

(Any two) = ½ + ½

b. Australian marsupials each differ from the other evolved from an ancestral stock, all within the Australian island continent. = ½ + ½

[2 Marks]

10. Name the type of immunity the mother provides the newborn baby. How does it happen?

Ans. Passive immunity = 1

Colostrum has (abundant) antibodies / IgA present = 1

[2 Marks]

11. Name the two primary lymphoid organs. State the importance of T-lymphocytes.

Ans. Thymus , Bone marrow = ½ × 2

Functions : helps B-cells in production of antibodies , mediate CMI , responsible for graft rejection (any one) = 1

[2 Marks]

12. How are malignant tumors different from benign tumors ? Why are some patients treated with α - interferons ?

Ans. Benign tumors remain confined to their original location/ do not spread to other part of the body / cause little damage / no metastasis ,

malignant tumors proliferate and spread to other body parts / is more harmful / cause serious damage / causes metastasis = ½ × 2 = 1

Biological response modifiers / activate immune system to destroy tumor = 1

[2 Marks]

OR

Name the hormone with which a cow is administered using MOET technology. State the function of this hormone.

Ans. Follicular Stimulating Hormone like / FSH like , to induce follicular maturation / super ovulation/ production of 6-8 eggs = 1 + 1

[2 Marks]

SECTION – C

(Q Nos. 13 - 22 are of three marks each)

13. Draw a longitudinal section of the pistil from a flowering plant, where pollination has occurred. Label the following:

(a) Stigma showing germinating pollen grains

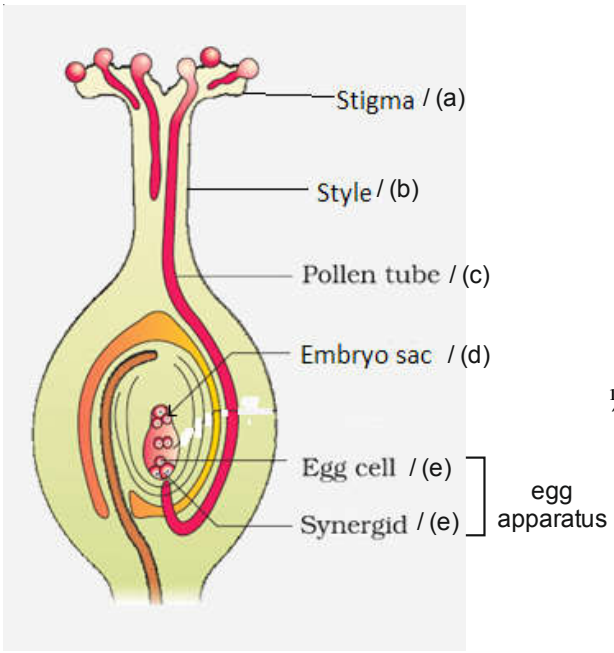
(b) Style

(c) Pollen tube reaching the micropyle of the ovule

(d) Embryo sac

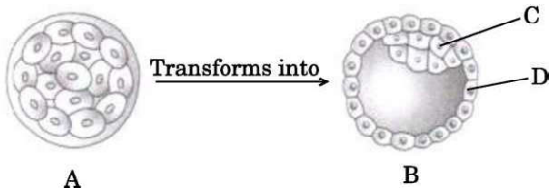
(e) Components of the egg apparatus

Ans.



½ × 6 = 3

14. Study the given diagram:



A is an embryonic stage that gets transformed into B, which in turn gets implanted in the endometrium in human females.

(a) Identify A, B and its parts C and D.

(b) State the fate of C and D in the course of embryonic development in humans.

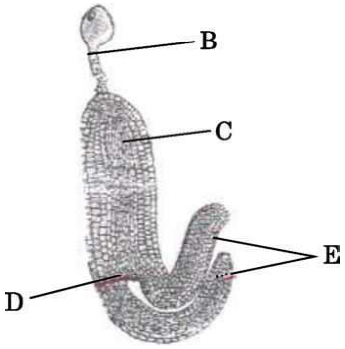
Ans. a) A - Morula ; B - Blastocyst ; C - Inner cell mass / Stem cells , D - Trophoblast = ½ × 4

b) C. (Inner cell mass) forms embryo / differentiates into germ layers (ectoderm / mesoderm / endoderm) , D. Trophoblast helps in attachment of embryo / to endometrium / forms chorionic villi / forms placenta = ½ × 2

[2 + 1 = 3 Marks]

OR

(a) Identify the figure given below and also identify the parts B , C , D and E.



(½ × 6 = 3)

(b) State the function of E.

Ans. a) Mature Dicot Embryo,

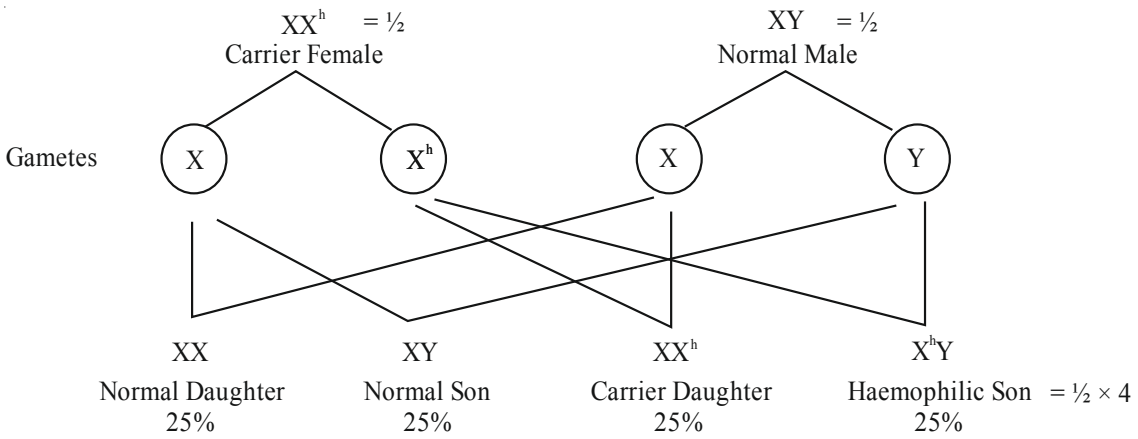
B-Suspensor ; C- Radicle ; D-Plumule ; E-Cotyledon ;

b) Storage of food reserves (as in legumes) = ½ × 6

[3 Marks]

Q 15. A normal couple has their first child, who is haemophilic. Work out a cross to show how it is possible. State the possibility of the normal and the haemophilic children, along with their sexes, that can be born to them.

Ans.



[3 Marks]

16. Starting from the pioneer species, trace the sequence that follows in an ecological succession on a bare rock, until climax community is reached in an ecosystem. Name this type of succession.

Ans. Lichens are the pioneer species on rocks , they secrete acid and dissolve rocks help in soil formation , pave way to bryophytes that hold small amount of soil , succeeded by higher plants / and scrub , after several stages a stable climax forest community is formed

Primary Succession / Xerarch (succession) = ½ × 6

[3 Marks]

17. The release of municipal wastewater and industrial waste into our natural water bodies is causing disastrous effect to the aquatic life. Explain the biological treatment that should be given to it before releasing into the natural water bodies.

Ans. The primary effluent is passed into large aeration tanks where it is mechanically constantly agitated and air is pumped into it, this allow growth of useful aerobic microbes into Flocs / masses of bacteria associated with fungal filaments , these microbes consume major part of organic matter in the effluent reducing BOD , effluent is passed into settling tanks where Flocs are allowed to sediment called activated sludge , a small part of this is pumped back into the aeration tank to serve as the inoculum , the remaining major part of the sludge is pumped into large tanks called anaerobic sludge digesters where anaerobic bacteria digest the bacteria and the fungi in the sludge. (During this digestion, bacteria produce a mixture of gases such as methane, hydrogen sulphide and carbon dioxide.) = ½ × 6

[3 Marks]

18. Mention any two advantages of micropropagation technique. Write how its process is carried out in the laboratory. Name any two important food plants grown commercially by this method.

Ans. Used for the production of large number of plants that are genetically identical to the original plant, recovery of healthy plants from diseased plant. = ½ + ½

Any part of the plant /explant is grown in the test tube under sterile conditions , in specified nutrient media (sucrose , inorganic salts , vitamins , amino acids , growth hormones - Auxin and cytokinin) = ½ + ½

Potato / Banana / sugarcane / tomato / apple (any two) = ½ + ½

[3 Marks]

19. When *Bacillus thuringiensis* enters a certain insect's body, the insect gets killed, but itself remains unaffected. Explain how it is possible.

Ans. *B. thuringiensis* forms protein crystals which contain a toxic insecticidal protein, Bt toxin protein remains as inactive protoxin , once an insect ingests the inactive toxin , it is converted into an active form of toxin due to alkaline pH of the gut , the activated toxin binds to midgut epithelial cells, and creates pores that cause swelling and lysis of the cells. = ½ × 6

[3 Marks]

20. (a) Write how parasites have evolved with adaptation to co-exist with their hosts in an ecosystem.

(b) Parasites are host specific and tend to co-evolve. How would the parasite respond if the host evolves a certain mechanism to resist or reject the parasite ?

Ans. a) Loss of unnecessary sense organs, presence of adhesive organs / suckers , loss of digestive system , high reproductive capacity. = ½ × 4

b) (If the host evolves special mechanism for rejecting or resisting a parasit) the parasite has to evolve a mechanism to counteract and neutralize them. = 1

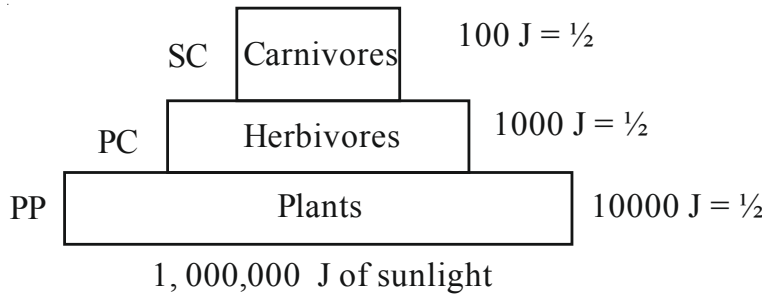
[3 Marks]

OR

(a) Name an ideal pyramid existing in an ecosystem. Construct it up to its three trophic levels along with their names.

(b) The sun provides 1,000,000 J of sunlight (solar energy) to an ecosystem. Write the amount of energy that is available to the first and third trophic levels, respectively.

Ans. a) Pyramid of energy is the ideal pyramid = ½



= ½ × 3

b) (from sun to primary producer 1%)

10,00,000J from sun, (1%) = 10,000 J

10,000 J ⟶ 1000J ⟶ 100 J

First trophic level = ½ Third trophic level ½

[½ + 1½ + 1 = 3 Marks]

21. Global carbon is fixed in the biosphere through photosynthesis.

(a) Explain any two ways by which carbon is returned to the atmosphere through natural processes.

(b) List any two human activities that have influenced the carbon cycle in nature.

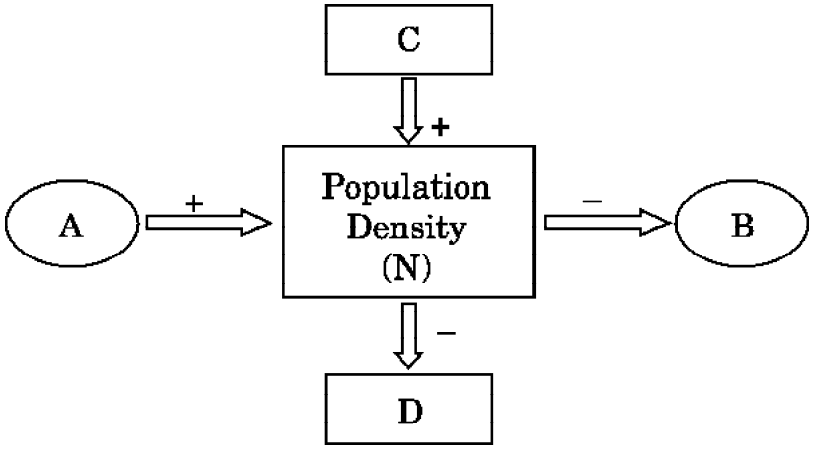
Ans. (a) Natural process - Respiration by plants and animals , decomposition (bacteria , fungi) = 1+1

(b) Human activities - burning of fossil fuel / burning of forest fuel wood / burning of leaves (any two) = ½ + ½

[2+1 = 3 Marks]

SECTION D

22.



Study the schematic representation given above and answer the following questions:

(a) Identify A in it.

(b) Identify D in it.

(c) When the population density at time t is N as shown above, write the population density at time t + 1 in the form of an equation using appropriate symbols.

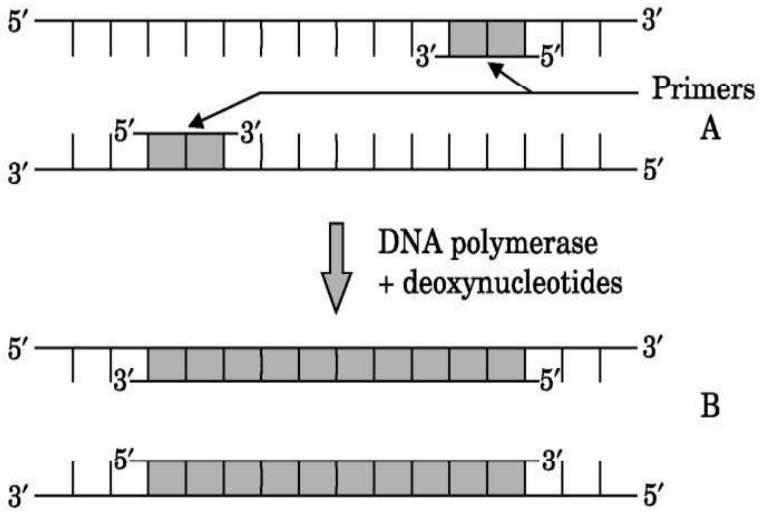
Ans. a) A = Natality / Immigration - =1

b) D = Emigration / Mortality = 1

c) N (t+1)=Nt+[(B+I)-(D+E)] = 1

[3 Marks]

23. (a) Identify steps A and B in a cycle of Polymerase Chain Reaction given below.



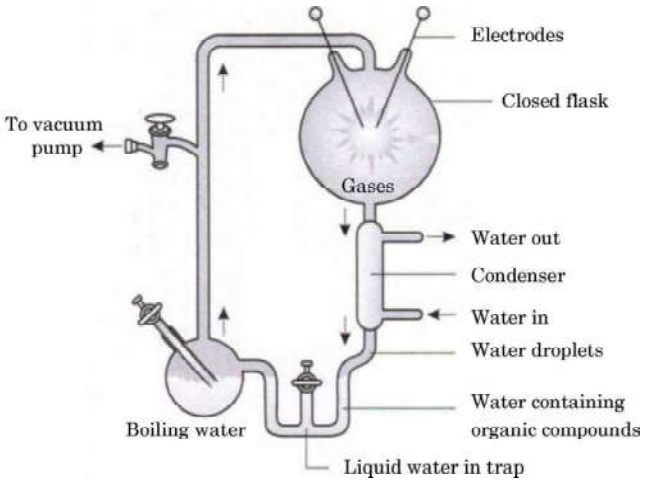
(b) State the specific characteristic feature of the enzyme in carrying step B.

Ans. a) A= Annealing; B=Extension = 1 + 1

b) Thermostable (DNA Polymerase) / remains active at high temperature = 1

[3 Marks]

24. Study the diagrammatic representation of S.L. Miller's experiment given below and answer the questions that follow :



(a) How did S.L. Miller create the conditions which existed before the origin of any life on Earth ?

(b) Name the organic compound formed and collected at the end of his experiment.

(c) Mention the kind of evolution his experiment supports.

Ans. (a) (Conditions existed before the origin of life -High temperature, volcanic storms, reducing atmosphere containing CH_4, NH_3, etc.)

Conditions were created by electric discharge (high temperature) in a closed flask containing CH_4, NH_3, H_2, water vapours = ½ × 4

b) amino acids = ½

c) chemical evolution = ½

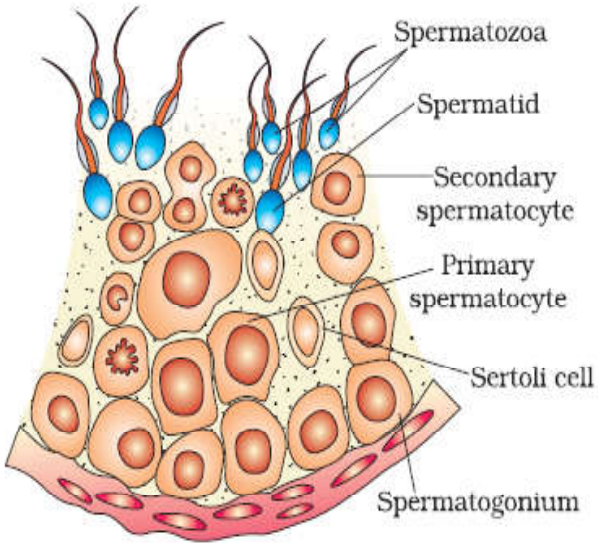
[3 Marks]

SECTION E

25. (a) Draw the sectional view of a seminiferous tubule of human. Label its any six parts.

(b) Name the pituitary hormones involved in the process of spermatogenesis. State their functions.

Ans. (a)



(any 6 parts) = ½ × 6

b) Pituitary hormones: Luteinising hormone (LH) , follicle stimulating hormone (FSH) = ½ + ½

(LH) Acts at the leydig cells and stimulates synthesis and secretion of androgens = ½

(FSH) Acts on sertoli cells and stimulates secretion of some factors which help in the process of spermiogenesis. = ½

OR

(a) IUDs are said to be effective contraceptives. Name any two commonly used IUDs and write the mode of their actions.

(b) When is sterilisation advised to married couples ? How is it carried out in a human male and a female, respectively?

Ans. a) - Lippes Loop , - increases phagocytosis of sperms within the uterus

- CuT / Cu7 / Multiload 375 , - Cu ions suppress sperm motility/ fertilising capacity of sperms

- Progestasert / LNG - 20 , - makes uterus unsuitable for implantation / makes cervix hostile to sperms (any two IUDs with their related actions) = ½ × 4

b) Sterilization advised for the male /female partner as terminal method to prevent any more pregnancies = 1

In male : part of vas deferens is cut and tied (vasectomy) = 1

In female: a small part of the fallopian tube is removed or tied up (tubectomy) = 1

[5 Marks]

26. Explain the expression of *lac* operon genes in *E. coli* growing in lactose containing culture medium.

Ans. In the presence of an inducer , lactose , the repressor is inactivated , by interaction with the inducer, this allows RNA polymerase access to the promoter , and transcription proceeds , lac mRNA is transcribed , ß galactosidase , permease , transacetylase is synthesised = ½ × 10

[5 Marks]

OR

Name the types of cells and the process by which hnRNA is formed. Describe the processing mechanism it undergoes before it becomes functional.

Ans. (hn RNA is formed) in eukaryotic cells , during transcription ,

Primary transcript contains both exon , introns is non-functional , it is subjected to splicing , where intros are removed, exons are joined in a defined order ,

hn RNA undergoes capping with nucleotide (methyl guanosine triphosphate) being added to the 5'-end of hn RNA ,

In tailing , adenylate residues (200-300) are added at 3'-end in a template independent manner. = ½ × 10

[5 Marks]

27. There is a great concern all over the world to conserve biodiversity for maintaining ecological balance in nature. Explain giving three reasons. Write different ways that have helped in increasing tiger population in our country.

Ans. Biodiversity should be conserved for the following three reasons:

a) <u>Narrowly utilitarian -</u> = ½

humans derive countless economic benefits from nature-

e.g. food (cereals, pulses, fruits) / firewood / fibre / construction material / industrial products (tannins, lubricants , dyes , resins , perfumes) / products of medicinal importance. (any one = ½)

b) <u>Broadly utilitarian -</u> = ½

Play role in many ecological services e.g. production of O_2 / pollination / Aesthetic pleasures = ½

c) <u>Ethical</u> - = ½

Every species has an intrinsic value / we have a moral duty to care for their well-being/ pass on our biological legacy in good order to future generations. = ½

The two approaches to save tiger is

a) In situ conservation = ½ – protect the natural habitat the forest where the tiger lives / protect the whole ecosystem to save tigers = ½

b) Ex situ conservation = ½ –threatened tigers are taken out of their natural habitat and placed in special settings for protection and special care / e.g. zoological park, wildlife sanctuaries. = ½

[3 + 2 = 5 Marks]

OR

What is integrated organic farming ? How did Ramesh Chandra Dagar, a farmer from Sonepat, Haryana effectively use this procedure and succeed with zero waste ?

Ans. Integrated organic farming is a cyclical procedure where waste products from one process are cycled in as nutrients for another process ,

His farm includes bee-keeping , dairy management , water harvesting , composting , agriculture in a chain of processes , There is no need to use chemical fertilizers , as cattle excreta (dung) is used as manure / natural fertilizer , Crop waste can be used to create compost, to generate natural gas for satisfying the energy needs of the farm. = ½ × 10

[5 Marks]