BLUE PRINT III

BIOLOGY

CLASS XII

S. No	Type of Questions ⟶ ↓ Units	VSA (1 mark)	SA II (2 marks)	SA I (3 marks)	LA (5 marks)	Total -
1.	Reproduction	2(2)	6(3)	6(2)	-	14(7)
2.	Genetic and Evolution	2(2)	2(1)	9(3)	5(1)	18(7)
3.	Biology in Human Welfare	1(1)	4(2)	9(3)	-	14(6)
4.	Biotechnology	2(2)	-	3(1)	5(1)	10(4)
5.	Ecology and Environment	1(1)	8(4)	-	5(1)	14(6)
	Total	**8(8)**	**20(10)**	**27(9)**	**15(3)**	**70(30)**

SAMPLE PAPER III

XII - BIOLOGY

Time : 3 Hours **Max. Marks : 70**

GENERAL INSTRUCTIONS :

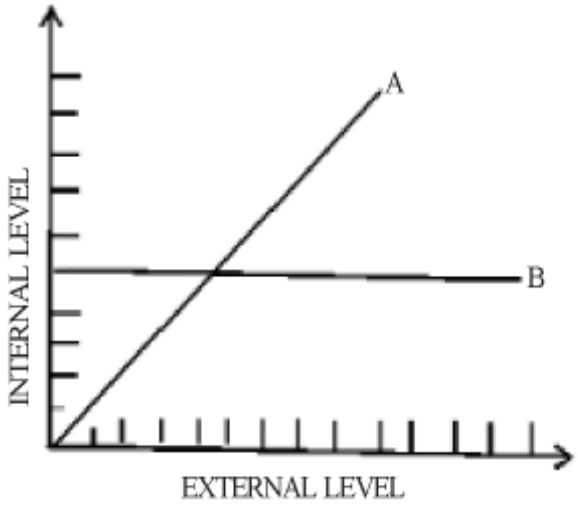
1. *All questions are compulsory.*
2. *The question paper consists of four sections A, B, C and D. Section-A contains 8 questions of 1 mark each, Section B is of 10 questions of 2 marks each, Section C has 9 questions of 3 marks each whereas Section D is of 3 questions of 5 marks each.*
3. *There is no overall choice. However, an internal choice has been provided in one question of 2 marks, one question of 3 marks and all the three questions of 5 marks weightage. A student has to attempt only one of the alternatives in such questions.*
4. *Wherever necessary, the diagrams drawn should be neat and properly labelled.*

SECTION - A

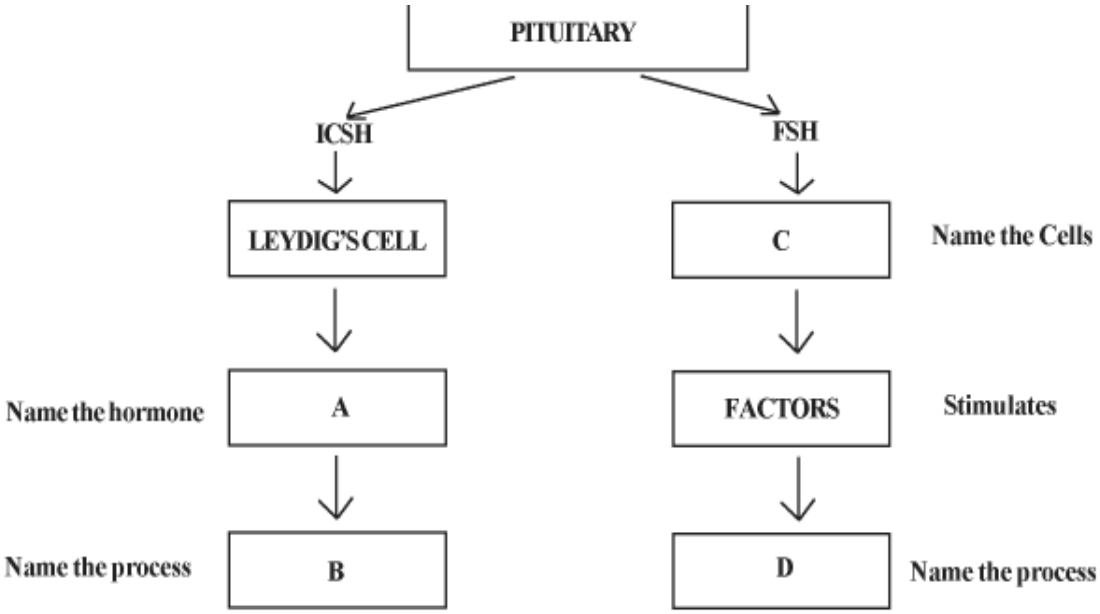
1. Cite an example of an inverted ecological pyramid. What kind of pyramid of energy would it have? 1
2. When is the structure and composition of a community expected to remain unchanged? 1
3. At what stage of life is oogenesis initiated in a human female? When does the oocyte complete oogenesis? 1
4. After a successful in-vitro fertilisation, the fertilised egg begins to divide. Where is this egg transferred before it reaches the 8-cell stage and what is this technique named? 1
5. AaBb was crossed with aabb. What would be the phenotypic ratio of the progeny? Mention the term to denote this kind of cross. 1
6. In F.Griffith's experiment, how did the nonvirulent strain of *Streptococcus Pneumoniae* become virulent?
7. State the use of :
   (i) *Trichoderma* with respect to organ transplant, and
   (ii) Nucleopolyhedrovirus with respect to pest management 1
8. Bacteria that convert milk into curd play two other beneficial roles. What are they?

SECTION B

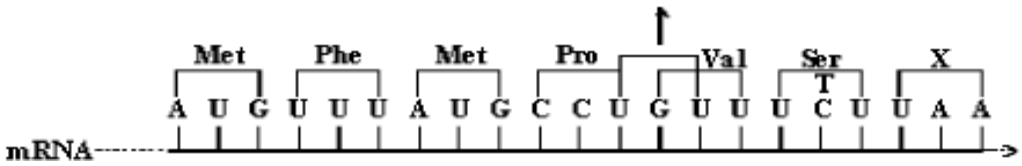
9. Given below is a graph depicting organismic response to changing external conditions. According to their re-sponse the organisms are grouped into two types. Name the type which will show (i) pattern A and (ii) pattern B. 2



10. Given below is an incomplete flow chart showing influence of hormones on gametogenesis in males. Observe the flow chart carefully and fill in the blanks A, B, C, and D 2



11. Read the sequence of the nucleotides in the given segment of mRNA and the respective amino acid sequence in the polypeptide chain.



Polypeptide : met-phe-met-proline-valine-serine

(i) Provide the triplet of bases (codon) for (a) valine (b) proline

(ii) Write the nucleotide sequence of the DNA strand from which this mRNA was transcribed

(iii) What does the last codon of this RNA stand for? 2

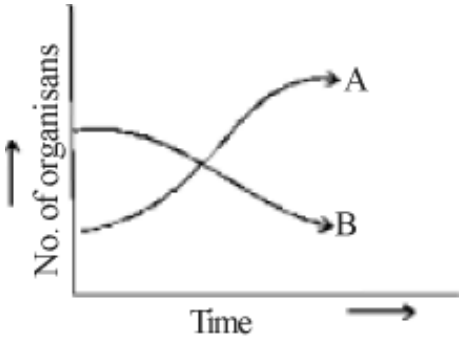
OR

11. The following table shows the genotypes for ABO blood grouping and their phenotypes. Fill in the gaps left in the table 2

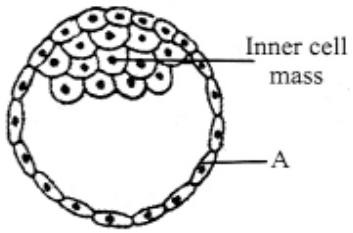
S.No.	Genotype	Blood Group
1	$I^A I^A$	A
2		A
3	$I^B I^B$	B
4		B
5	$I^A I^B$	
6		O

12. (a) The graph below represents the growth patterns of two types of aquatic organisms over a brief period of time in a water body surrounded by an agricultural land extensively supplied with fertilisers. Identify the organ-isms that would represent (i) A and (ii) B.

(b) State the reason for such a change in the water body and also write the term given to it.



13. Study the figure given below and answer the questions that follow:



(a) Name the stage of human embryo the figure represents.

(b) Identify 'A' in the figure and mention its function.

(c) Mention the fate of the inner cell mass after implantation in the uterus.

(d) Where are the stem cells located in this embryo**?**

14. Following are the steps in MOET programmme for herd improvement in which a cow has been administered hormones with FSH like activity. Arrange steps A to D in their correct sequence.

A - Transferred to a surrogate mother.

B - It is either mated with an elite bull or artificially inseminated.

C - Fertilised eggs at 32 cell stage are recovered non surgically.

D - It produces 6-8 eggs instead of one egg which they normally yield per cycle. 2

15. (i) In which disease is there an uncontrolled division of cells resulting in formation of tumours? How is this disease detected?

(ii) How do interferons help in controlling the disease?

16. State the principle underlying 'gel electrophoresis' and menttion two applications of this technique in biotech-nology. 2

17. You have developed a GM organism. Which government organisation will you approach to obtain clearance for its mass production? Why is such a body necessary? Give two reasons. 2

18. A person shows a strong immunogenic reactions while exposed to certain substances. Name this condition and common term for such substances. Mention the cell and its chemical which causes this condition.

SECTION C

19. Amazonian rain forest has the greatest biodiversity on earth. List any two hypotheses that are proposed by the biologists to account for the greater biological diversity. 3

20. (a) In which part of the human female reproductive system do the following events take place?

I - Release of 1st polar body.

II - Release of 2nd polar body.

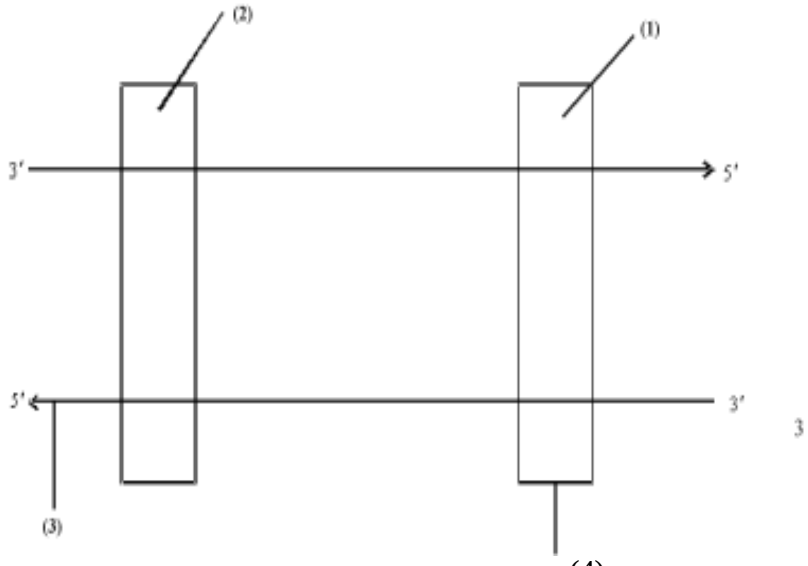
III - Fertilisation

IV - Implantation

(b) From where do signals for parturition originate and what does maternal pituitary release for stimulating uterine contractions for child birth? 3

21. A true breeding tall plant is crossed with a true breeding dwarf plant. F_1 progeny is 100% tall and F_2 has tall : dwarf in the ratio 3:1 (i) Explain why F_1 shows only one tpye of parental phenotype; (ii) Name the patterns of inheritance in which the ratio deviates from above. Also mention the deviated phenotypic ratio. 3

22. In the following diagram the two DNA strands represented are ready for transcription



3

(4)

(i) Label the parts marked 1 to 4 and state their functions in transcription.

(ii) Which one of the two strands of DNA has nucleotide sequence similar to the mRNA that will be transcribed and why?

23. State in what ways Stanley Miller simulated the conditions of :

(i) Primitive atmosphere on earth.

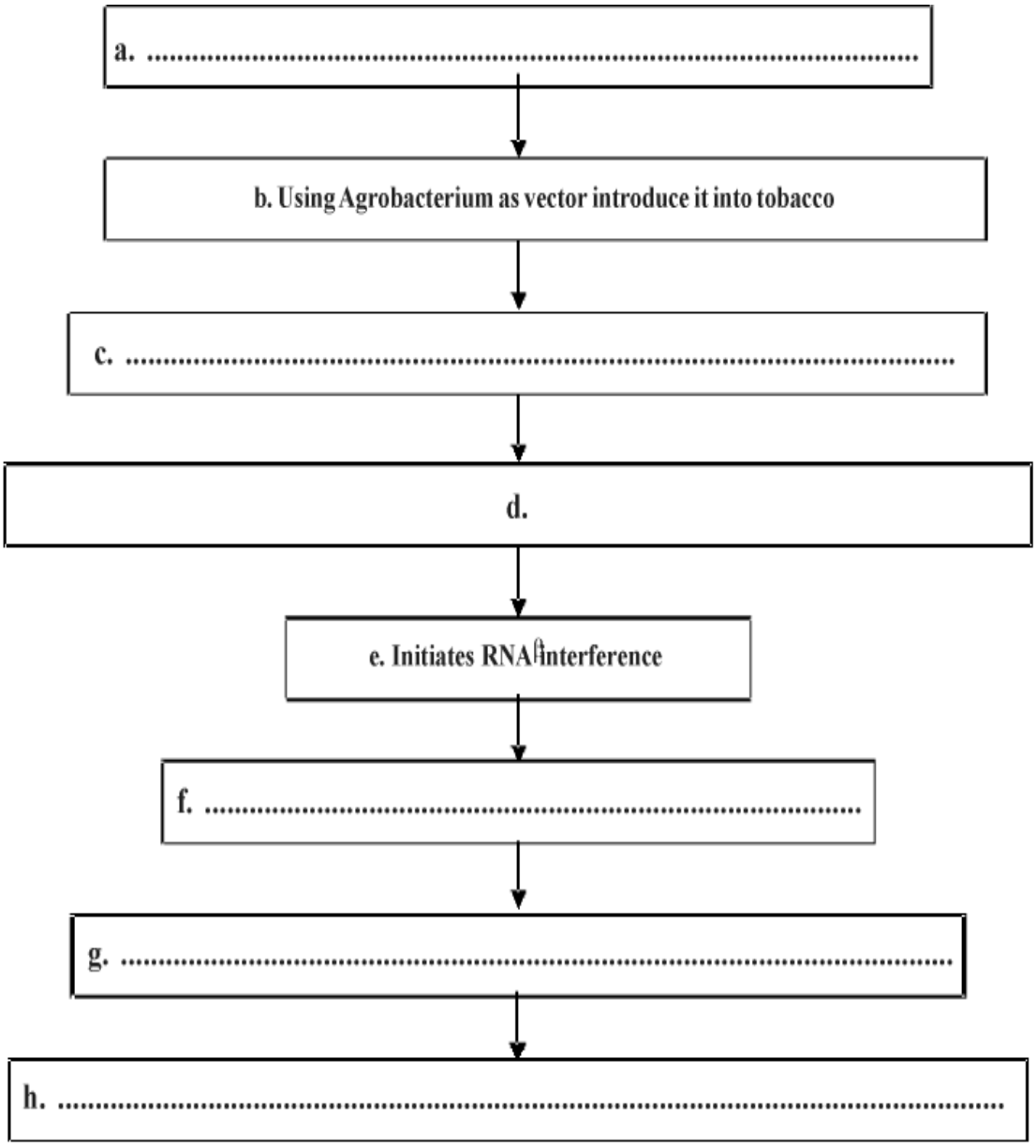
(ii) Energy source at the time of origin of life, and

(iii) Formation of organic molecules of life to prove the theory of chemical evolution. 3

24. Draw a flow chart to depict the multiplication of an HIV virus in a host cell. 3

25. What are "flocs"? State their role in effluent treatment and their ultimate fate in sewage treatment tank. 3

26. Two of the steps involved in producing nematode resistant tobacco plants based on the process of RNAi are mentioned below. Write the missing steps in its proper sequence.

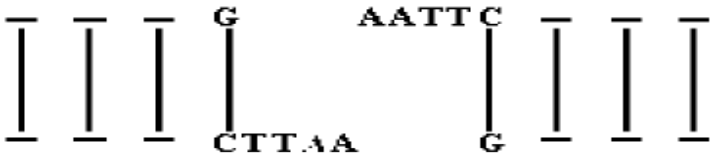


3

OR

27. An interesting property of restriction enzymes is molecular cutting and pasting. Restriction enzymes typically recognize a symmetrical sequence of DNA.

28. Notice that the top strand is the same as the bottom strand, but reads backward. When the enzyme cuts the strand between G and A, it leaves overhanging chains:



A. What is this symmetrical sequence of DNA known as?

B. What is the significance of thsese overhanging chains?

C. Name the restriction enzyme that cuts the strand between G and A 3

SECTION D

28. (i) A decade back, the enormous vehicular traffic in Delhi had made Delhi rank 4th among polluted cities of the world. Two measures taken by the Delhi Government brought marked improvement in air quality by 2005. What were these two measures and how did they reduce air pollution? 3

(ii) What is the norm set by Euro II for petrol and diesel vehicles?

OR

How is the "sixth episode of extinction" of species on earth, now currently in progress, different from the five earlier episodes? What is it due to? Explain the various causes that have brought about this difference.

29. (a) Draw the embroyo sac of a flowering plant and label (i) central cell (ii) Chalazal end of the embryo sac (iii) synergids.

(b) Name the cell that develops into the embryo sac and explain how this cell leads to the formation of Embryo sac . Also mention the role played by the various cells of the embryo sac. 5

OR

Show diagrammatically the stages of embryonic development from zygote upto implantation in humans. 5

30. Name the genes that constitute an operon. How does lac operon get switched on in the presence of lactose? 5

OR

With the advent of rDNA technology a powerful tool is available to identify a criminal or to the real parents. Name this technique. Write the missing steps in the procedure given below. There of three steps are mentioned in the flow chart: Extraction of DNA from the cells - (ii).....→(iii) DNA is cut into fragments by restriction enzymes → (iv).....→ (v).....→ (vi).....→ (vii) Autoradiography. .....→ (viii).....→ 5

Marking Scheme
Sample Paper-III
XII - Biology

1. Sea/Forest/Large tree ½ + ½ = 1

   Upright

2. When the environment remains unchanged 1

3. Embryonic life ½ + ½ = 1

   When the sperm enters the egg/at the time of fertilization

4. Fallopian tube/oviduct; ZIFT/zygote intra fallopian transfer ½ + ½ = 1

5. 1 : 1 : 1 : 1 : ; Test cross ½ + ½ = 1

6. Bacterial transformation/transfer of genetic material/by acquiring genes for smooth coat 1

7. a : Trichoderma - Biocontrol agent of several plant pathogens/ produces Cyclosporin A which is used as an immunosuppressive agent in organ transplant patients

   b. Nucleopolyhedrovirus - Narrow spectrum insecticide ½ + ½ = 1

8. Increase in nutritional quality/Vitamain B_{12} check disease causing microbes in the stomach

   ½ + ½ = 1

9. A. Conformers

   B. Regulators 1+1 = 2

10. A. Androgen/Testosterone/male hormone

    B. Spermatogenesis

    C. Sertoli Cells ½ x 4 = 2

    D. Spermiogenesis

    Stop marking at incorrect entry

11. (a) (i) GUU

    (b) (i) CCU

    (ii) TACAAATACGGACAAAGAATT ½ x 4 = 2

    (iii) UAA stands as stop signal.

    I^Ai A Blood group $I^A I^B$ - AB blood group

    I^Bi - B blood group ii - O Blood group

12. (A) i. Water Hyacinth / Algal growth

    ii. Fish / Aquatic animals

    (B) i. Excessive growth of algae triggered by nitrates and phosphates from agricultural land run off water.

    ii. Algal bloom / Eutrophication ½ x 4 = 2

13. (a) Blastocyst.

(b) Trophoblast. It helps in attachment of the blastocyst to the endometrium of uterine wall.

(c) The inner cell mass gets differentiated as the embryo.

(d) The inner cell mass contains certain cells called stem cells which have the potency to give rise to all the tissues and organs.

14. It produces 6-8 eggs instead of one egg which they normally yield per cycle It is either mated with an elite bull or artificially inseminated ½ x 4

Fertilised eggs at 32 cell stage are recovered non - surgically Transferred to surrogate mothers

15. (a) Cancer ; Radiography / Computerised Tomography / Magnetic Resonace Imaging/ any other correct ones ½ x 4

(b) Activate the immune system and help in destroying the cancer cells

16. (a) Technique where charged molecules are separated on their molecular weight, Gel acts as a sieve. ½ x 4

(b) DNA figerprinting / Cloning of rDNA / any other correct two points

17. i. GEAC - Genetic Engineeering Approval Committee

ii. Makes decisions regarding validity of GM research; checks safety of introducing GM-organisms for public services. may harm living organisms. GMO has unpredictable results ½ x 4

18. Allergy

Allergens

Mast Cells

Histamine / Serotonin ½ x 4

19. It is a tropical rain forest

A. Speciation is a fuction of time, unlike temporate regions, tropics have remained relatively undisturbed for millions of years and thus had long evolutionary time for species diversification.

B. Tropical environments are more constant, predictable and less seasonal. Variations Such constant envi-ronments promote niche specialisation and lead to a greater diversity 1½ x 2

C. More solar energy available - higher productivity - greater diversity (Any two hypotheses)

20. (a) i. In the ovary

ii. In the isthmus - ampullary junction of Fallopian tube

iii. Same as (ii) ½ x 4

iv. In the uterus

(b) fully developed foetus and placenta; Oxytocin/Pitocin

21. (a) Case of dominance where allele T is dominant over allele t that is both heterozygous and homozygous dominant express the dominant trait.

(b) Case of incomplete dominance 1 : 2 : 1/ Co-dominance 1 : 2 : 1 1½ + ½

22. (i) 1. Template strand

2. Promoter ½ x 4 = 2

3. Coding strand

4. Terminator

(ii) Coding strand because both mRNA and the coding strand are complementary to template strand. 1

23. (i) In a closed flask containing NH_3, CH_4, H_2 and Water Vapour to simulate primitive atmosphere
(ii) Electric discharge to simulate on primitive earth

(iii) Formation of compounds like amino acids from simple molecules like NH_3, CH_4, H_2 1x 3

24. a. HIV enters the macrophage (human cell)

b. Viral RNA genome replicates into DNA with the help of reverse transscription

c. Viral DNA is incorporated into host DNA

d. Viral DNA directs infected cell to produce viral particles

e. Virus comes out while infected cell continues producing HIV particles

f. New HIV particles infect Helper T cells which lead to decrease in Helper T cells. ½ x 6

25. (a) Masses of aerobic bacteria associated with fungal filaments

(b) While growing they consume large amount of o?rganic matter of the effluents reducing BOD

(c) When effluent goes to settling tank and flocs are allowed to sediment for activated sludge, they get digested by anaerobic bacteria 1 + 1 + 1

26. (a) Isolate Nematode specific genes

(b) Produces sense and antisense RNA in the host cells

(c) Being complementary sense and antisense RNA form double stranded RNA (ds RNA)

(d) Silence the specific mRNA of the Nematode

(e) Parasite cannot survive in the transgenic tobacco host expressing RNAi

(f) Thus the transgenic plant tobacco is protected from nematode

26. A. (i) Insertional activation : A recombinant DNA is inserted within the coding sequence of an enzyme -galactosidase, results in inactivation of the enzyme

(ii) The bacterial colonies whose plasmids donot have the insert produce blue colour but those with an insert do not produce colour

B. Simple and easier method of selecting recombinants from non-recombinants.

27. (a) Palindromic nucleotide sequence / Recognition sequence.

(b) DNA fragments from two different molecules which have the same kind of sticky ends overhanging chains can be joined together (end to end) by DNA ligases. 1 x 3

(c) EcoRI

28. 1. Changing of all buses to run on CNG

a. CNG burns most efficiently

b. Cheaper than petrol or diesel

c. Cannot be siphoned off by thieves / adulterated like petrol or diesel

2. a. Phasing out of old vehicles ½ x 8

b. use of unleaded petrol / use of low sulphur petrol / diesel ½ + ½

c. Use of catalytic converters in vehicles norms or any other correct two points each

Euro II

a. stipulates that sulphur to be controlled at 350 ppm in diesel and 150 ppm in petrol.

b. Aromatic hydrocarbons are to be contained at 42% of the concerned fuel.

OR

1. The difference is that 6th episode of extinction is taking place at a 100 to 1000 times faster than the earlier ones. ½

2. It is largley due to human activities ½

The various causes are:

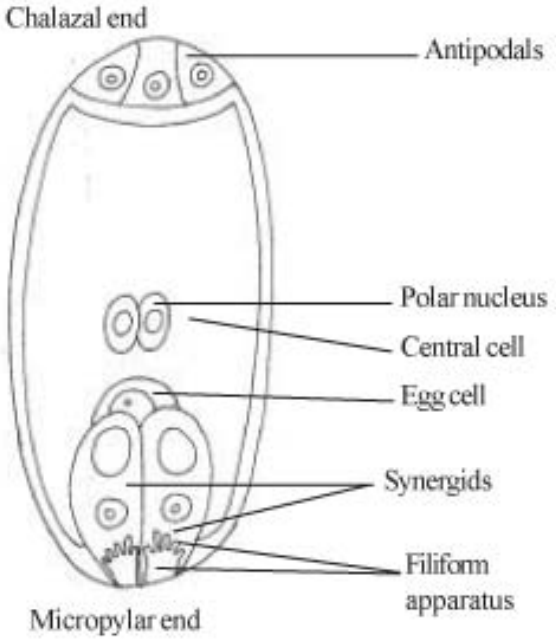
a. Habitat loss and fragmentation

b. Over exploitation

c. Introduction / Invasion of alien species

d. Co-extinctions } 1 × 4 = 4 1 + 4 = 5

29. (a) Three correct labels



(b) i. The functional megaspore developes into embryo sac

ii. Nucleus undergoes mitotic division and the two cells move to the opposite poles

iii. Two successive mitotic division - an eight nucleate embryo sac ½ × 3

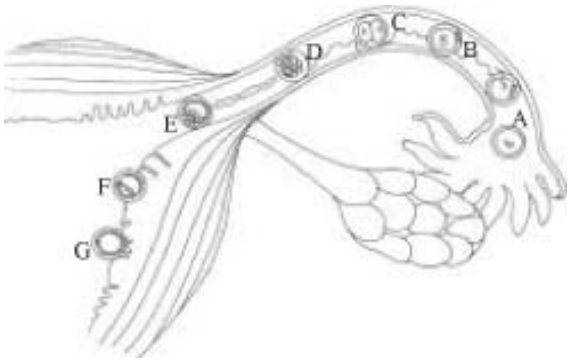
iv. Cell wall formation takes place after nuclear divisins ½ × 7

v. Three cells group together at the micropylar end - egg apparatus with an egg cell and two synergids

vi. Three cells group together at the chalazal end - antipodal cells

vii. The remaining two nuclei move to the centre - fuse to form secondary nucleus. 5

OR



Zygote ———	A		½
Cleavage ——	B	2 celled stage	½
	C	4 celled stage	½
	D	Morula with vitelline membrane	1
	E	Blastocyst with trophoblast and inner cell mass	1
	F	Implantation f blastocys	½
	G	In the endometrium within wal	½

30. i. Regulator gene, Promoter gene. Operator gene and structural gene

1. An inducible operon where Lactose is the inducer and it is the substrate for the enzyme B-galactosidase
2. Three structural genes (z, y, a) which transcribe the polycistronic mRNA
3. z codes for - galactosidase, y for permease and a for transacetylase
4. Near the structural genes is the promoter gene where RNA polymerase binds for transcription
5. An operator gene as a switch near the promoter where a repressor always binds.
6. Repressor protein coded by the i gene prevents the RNA polymerase from transcribing by binding to the operator
7. Lactose, an inducer inactivates the repressor and prevents it from binding to the operator.
8. Allows an access for the RNA polymerase to the promoter
9. Transcription takes place

10. The substrate lactose regulates the lac-operon. ½ × 10 = 5

OR

DNA finger printing ; (ii) Amplification by polymerase chain reaction

(iv) - Separation of DNA fragments by gel electrophoresis

(v) - Southern blotting 1 × 5 = 5

(vi) - Hybridization using probe tragment

(viii) M atching of DNA fragment photographs and interpretation.