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Sample Question Paper (02) 2023-24 01				
SUBJECT:	BIOLOGY		**CLASS :**	**XII**
TIME :	3:00 hour		**Max. Marks :**	**70**

Instructions :

(i) All questions are compulsory.
(ii) The question paper has five sections and 33 questions. All questions are compulsory.
(iii) Section–A has 16 questions of 1 mark each; Section–B has 5 questions of 2 marks each; Section– C has 7 questions of 3 marks each; Section– D has 2 case-based questions of 4 marks each; and Section–E has 3 questions of 5 marks each.
(iv) There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
(v) Wherever necessary, neat and properly labeled diagrams should be drawn.

SECTION -A

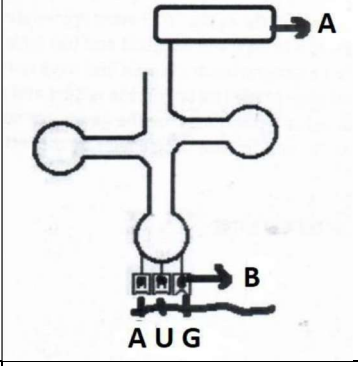
Q.1 In *E.coli*, the lac operon gets switched on when — 1M

A. lactose is present and it binds to the repressor.
B. repressor binds to operator.
C. RNA polymerase binds to the operator.
D. lactose is present and it binds to RNA polymerase.

Q.2 Oswald Avery, Colin MacLeod and Maclyn McCarty used enzymes to purify biochemicals such as proteins, DNA and RNA from the heat-killed S cells to see which ones could transform live R cells into S cells in Griffith's experiment. They observed that — 1M

A. Proteases and RNases affected transformation.
B. DNase inhibited transformation.
C. Proteases and Lipases affected transformation.
D. RNases inhibited transformation.

Q.3 — 1M



AUG on the mRNA will result in the activation of which of the following RNA having correct combination of amino acids:

	SITE A	SITE B
A	UAC	Methionine
B	Methionine	UAC
C	Methionine	AUG
D	AUG	Methionine

Q.4 Short stretches of DNA used to identify complementary sequence in a sample arecalled — 1M

A. probes B. markers
C. VNTRs D. primers

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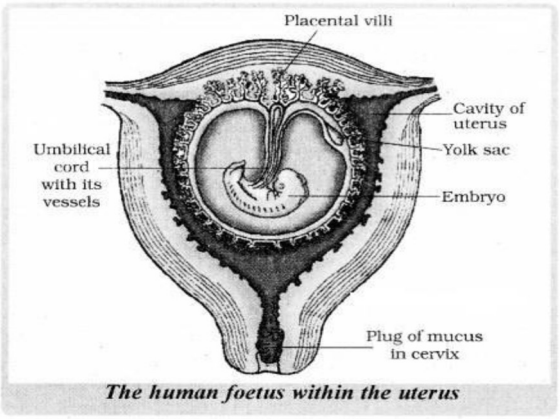
Q.5	Concentration of which of the following substances will decrease in the maternal blood as it flows from embryo to placenta through the umbilical cord? i. Oxygen ii. Amino Acids iii. Carbon dioxide iv. Urea A. i and ii B. ii and iv C. iii and iv D. i and iv  *The human foetus within the uterus*	1M
Q.6	In a fertilized ovule, n, 2n and 3n conditions occur respectively in A. antipodal, zygote and endosperm B. zygote, nucellus and endosperm C. endosperm, nucellus and zygote. D. antipodals, synergids and integusments	1M
Q.7	A botanist studying *Viola* (common pansy) noticed that one of the two flower types withered and developed no further due to some unfavorable condition, but the other flower type on the same plant survived and it resulted in an assured seed set. Which of the following will be correct? A. The flower type which survived is Cleistogamous and it always exhibits autogamy B. The flower type which survived is Chasmogamous and it always exhibits geitonogamy. C. The flower type which survived is Cleistogamous and it exhibits both autogamy and geitonogamy. D. The flower type which survived is Chasmogamous and it never exhibits autogamy.	1M
Q.8	During parturition, a pregnant woman is having prolonged labour pains and child birth has to be fastened. It is advisable to administer a hormone that can A. increase the metabolic rate. B. release glucose in the blood. C. stimulate the ovary. D. activate smooth muscles.	1M
Q.9	A female undergoing IVF treatment has blocked fallopian tubes. The technique by which the embryo with more than 8 blastomeres will be transferred into the female for further development is A. ZIFT B. GIFT C. IUT D. AI	1M
Q.10	The mode of action of the copper ions in an IUD is to A. increase the movement of sperms. B. decrease the movement of the sperms. C. make the uterus unsuitable for implantation. D. make the cervix hostile to the sperms.	1M
Q.11	To produce 400 seeds, the number of meiotic divisions required will be	1M

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	A. 400 B. 200 C. 500 D. 800	
Q.12	In *Antirrhinum,* RR is phenotypically red flowers, rr is white and Rr is pink. Select the correct phenotypic ratio in F1 generation when a cross is performed between RR X Rr: A. 1 red: 2 Pink: 1 white B. 2 Pink: 1 white C. 2 Red: 2 Pink D. All Pink	1M
	Question No. 13 to 16 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below: A. Both A and R are true and R is the correct explanation of A B. Both A and R are true and R is not the correct explanation of A C. A is true but R is false D. A is False but R is true E. both assertion and reason are false	
Q.13	Assertion: Lactational amenorrhea is the natural method of contraception. Reason: It increases the phagocytosis of sperm.	1M
Q.14	Assertion: Mammals from colder climates generally have shorter ears and limbs Reason: This adaptation helps them to minimize heat loss	1M
Q.15	Assertion: The milk of Rosie cow is nutritionally more balanced for infants. Reason- Rosie‘s milk contain 2.4 g/L of human lactalbumin.	1M
Q.16	Assertion: Restriction endonucleases cut the DNA at the specific sites called restriction sites. Reason: All restriction enzymes have same restriction sites.	1M
	SECTION -B	
Q.17	What do you understand by the following terms –minisatellite, codon, exon, andoperon?	2 M
Q.18	If a given segment of double-stranded DNA has 20% guanine, calculate the percentof adenine in the DNA.	2M
Q.19	How do the following help in cancer treatment? i) Alpha interferon ii) Radiotherapy	2 M
Q.20	Mention the characteristics of a stable community.	2 M
Q.21	How and why is the bacterium *Thermus aquaticus* employed in recombinant DNA technology? Explain.	2 M
	SECTION -C	
Q.22	Refer to the figure given below and answer the questions that follow:  Wolf Tasmanian wolf a) Explain the process by which Tasmanian wolf evolved.	3 M

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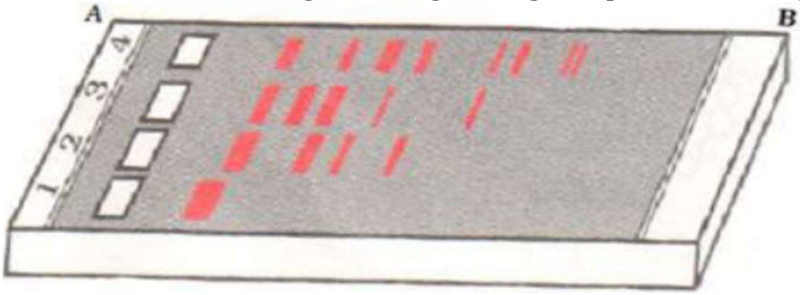
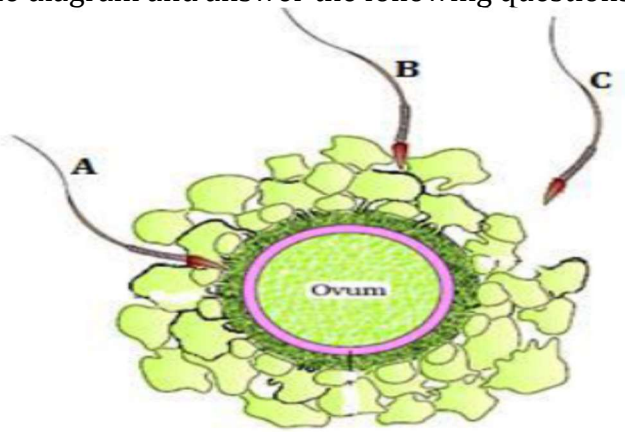
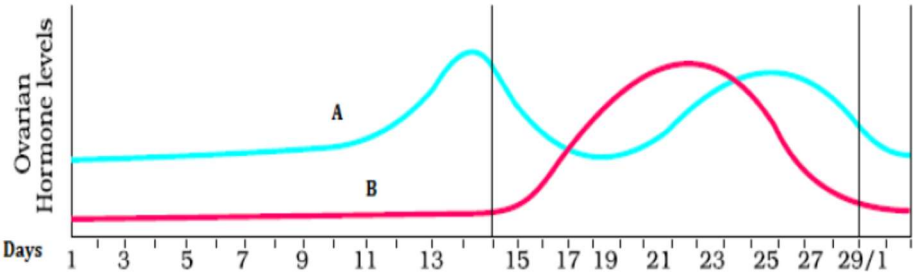
	b) Name the process that has resulted in evolution of wolf and another similar animal such as Tasmanian wolf. c) Compare and contrast the two animals shown?	
Q.23	Given below is the diagram of agarose gel kept under UV light:  a) Mark the positive and negative terminals. b) What is the charge carried by DNA molecule and how does it help in its separation? c) How are the separated DNA fragments finally isolated? OR *CryIAb*is introduced in a plant to prevent infestation by corn borer. a) What is the resultant plant referred as? b) Summarize the action of the gene introduced.	3 M
Q.24	Differentiate between spermatogenesis and oogenesis, with reference to the following aspects: (a)formation and multiplication of oogonial and spermatogonial cells. (b)number of gametes produced from one gamete mother cell. (c)completion of the processes.	3M
Q.25	Give reasons for the following: a) Larger holes are observed in Swiss cheese. b) Alcoholic content in whisky is more than in beer, although both are made using malted barley and yeast. c) Nucleo-polyhedroviruses can be used effectively in ecologically fragile areas.	3M
Q.26	i) How does primary immune response differ from secondary immune response? ii) How do spleen and MALT help to defend body from diseases?	3M
Q.27	What is genetic engineering? List the steps involved in rDNA technology?	3M
Q.28	Explain Verhulst-Pearl Logistic Growth of a population.	3M
	SECTION -D	
Q.29	A person in your colony has recently been diagnosed with AIDS. People /residents in the colony want him to leave the colony for the fear of spread of AIDS. A) Write your view on the situation, giving reasons. B) List the possible preventive measures that you would suggest to the residents of your locality in a meeting organized by you so that they understand the situation. C) Write the symptoms and causative agent of AIDS .	4M
Q.30	eing a crowd of students in one corner of the school, the Principal rushed to see the matter and found some children beating and chasing a small monitor lizard. On seeing the Principal, all the children fled to their classes except Alok who requested	4M

	the Principal to arrange for some medical assistance for the injured animal. The Principal rewarded the student. (a) Was Alok an indiscipline boy who did not run to the class on seeing the Principal? What values does the act promote? b) How do endangered species differ from vulnerable species? c) Mention the factors resulting in loss of biodiversity / extinction.	
	SECTION -E	
Q.31	Given below is the diagram of a human ovum surrounded by a few sperms. Observe the diagram and answer the following questions:  a) Compare the fate of sperms shown in the diagram. b) What is the role of zona pellucida in this process? c) Analyze the changes occurring in the ovum during the process. d) How is the entry of sperm into the ovum facilitated? e) Specify the region of female reproductive system where the event represented in the diagram takes place. OR The graph given below shows the variation in the levels of ovarian hormones during various phases of menstrual cycle:  a) Identify 'A' and 'B'. b) Specify the source of the hormone marked in the diagram. c) Reason out why A peaks before B. d) Compare the role of A and B. e) Under which condition will the level of B continue to remain high on the 28thday?	5M
Q.32	a) Name the phenomenon, in which a single gene product produces more than one phenotypic effect.	5M

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	b) Give an example to it, one each from plants and human. c) Give the genotypes, and phenotypic effects, in both cases mentioned above. d) Out of the above-mentioned genotypes, which one shows incomplete dominance? OR Multiple allelism, polygenic inheritance, polyploidy and polycistronic gene are terms which refer to 'many'. i) How does polygenic inheritance differ from multiple allelism? ii) Why is it said that multiple allelism exists only in populations, and not in individual organisms? iii) How are polyploids formed? iv) What do you mean by polycistronic gene? In which group of organisms are they found?	
Q.33	Name the components a bioreactor must possess to achieve the desired product? What is Bioreactor? What are the advantages of Stirred tank Bioreactor over Shake flask. Show diagrammatically a simple Stirred tank Bioreactor? OR What are Restriction enzyme? Why do bacteria have these restriction enzymes. Show diagrammatically a restriction enzyme its recognition & the product it produces?	5M

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SAMPLE QUESTION PAPER-(02) 2023-24

BIOLOGY (044)

Theory CLASS XII

Max.Marks70 **Time allowed 3 hours**

General Instruction:

(i) All questions are compulsory.

(ii) The question paper has five sections and 33 questions. All questions are compulsory.

(iii) Section–A has 16 questions of 1 mark each; Section–B has 5 questions of 2 marks each; Section– C has 7 questions of 3 marks each; Section– D has 2 case-based questions of 4 marks each; and Section–E has 3 questions of 5 marks each.

(iv) There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.

(v) Wherever necessary, neat and properly labeled diagrams should bedrawn.

SECTION-A

1. An IUD that is recommended to suppress sperm mortality and the fertilizing capacity of sperm is-
   a) LNG-20.
   b) Multiload 375
   c) Progestasert
   d) Lippe's loop
2. Match the items of column A with those in column B.

Column A	Column B
A. Copper releasing IUD	1. Sterilisation in males
B. Hormone –releasing IUD	2. Progesterone-estrogen combination
C. Vasectomy	3. Progestasert
D. Oral contraceptive	4. Multiload 375

   a) A-4, B-3, C-1, D-2 b) A-4, B-1, C-2, D-3
   c) A-4, B-3, C-2, D-1 d) A-2, B-3, C-4, D-1
3. When an amino acid is coded by more than one codon, the genetic code is said to be-
   a) Universal
   b) Punctuated
   c) Comma less
   d) Degenerate
4. Darwin's finches are an excellent example of –
   a) Seasonal migration b) Brood parasitism
   c) Adaptive radiation d) Connecting links
5. Anti-venom against snake poison contains-
   a) Antigen b)Antigen-antibody complex
   c) Antibody d) Enzymes

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6. In a person infected by Plasmodium sp. Haemozoin is released at periodic intervals from-
   a) T- lymphocytes b) B- lymphocytes
   c) Red blood cells d) Neutrophils
7. Which of the following is correctly matched pair?
   a) Mycorrhizae- Mineral uptake from soil
   b) Azospirillum- Symbiotic N2 fixation
   c) Rhizobium- Parasitic in roots of legumes
   d) Azotobacter- Free-living N2 fixing cyanobacterium
8. In the Biolistic method of gene transfer, micro particles coated with foreign DNA are bombarded into the target cells at a very high velocity. These micro particles are made of-
   (a) gold and silver b) silver and tungestun
   (c) gold and tungestun(d) platinum and silver
9. Which of the following is not a correct matching pair between the organism and the kind of interactions?
   a) An orchid plant on Mango tree- Parasitism
   b) Cuscuta on a hedge plant- Parasitism
   c) A sparrow feeding on seeds- Predation
   d) Rhizobium in root nodules of legumes- Mutualism
10. A biologist studied the population of rats in a barn. He found that the average natality was 130, average mortality 120, immigration 20 and emigration 30. The net increase in the rat population mentioned above is-
   a) 20 b) 10
   c) 05 d) Zero
11. In a food chain, the maximum number of organisms belong to –
   a) Producers b) Primary consumers
   c) Secondary consumers d) Tertiary consumers
12. Broadly utilitarian argument for the conservation of biodiversity does not include-
   a) Pollination of plants b)Oxygen evolution by photosynthesis
   b) Regulation of climate and water cycle d) Bioprospecting

Question No. 13 to 16 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

A. Both A and R are true and R is the correct explanation of A.
B. Both A and R are true and R is not the correct explanation of A.
C. A is true but R is false.
D. A is False but R is true.
E. Both assertion and reason are false.

13. Assertion: Seeds of Beet and Black pepper have perisperm, which is not found in pea seeds.
   Reason: Perisperm and Endosperm have the same function.
14. Assertion: The progenies of a test cross can be easily analysed to predict the genotype of the test organism.
   Reason: In a typical test cross, an organism showing a recessive phenotype is crossed with a recessive parent instead of selfing.

15. Assertion- A patient of ADA –deficiency requires periodic infusion of genetically – engineered lymphocytes.
    Reason- Lymphocytes are not immortal, but have life-span.
16. Assertion: When the resources are unlimited in the habitat, any species has the ability to realize fully its innate potential to reproduce.
    Reason: The population of such species shows a sigmoid growth curve.

SECTION - B

17. What is colostrum? Why is it essential for the new born baby?
18. (a) Name the event during cell cycle that results in the gain or loss of chromosome.
    (b) The son of s haemophilic Man may not get this genetic disorder. Mention one reason.
19. List any two diseases that spread through inhaling droplets/ aerosols. Write one prominent symptom of each one of them.
20. Explain the role of regulatory gene in lac operon. Why is the regulation of the operon called negative regulation?
21. The pyramid of biomass is not always upright. Explain why.

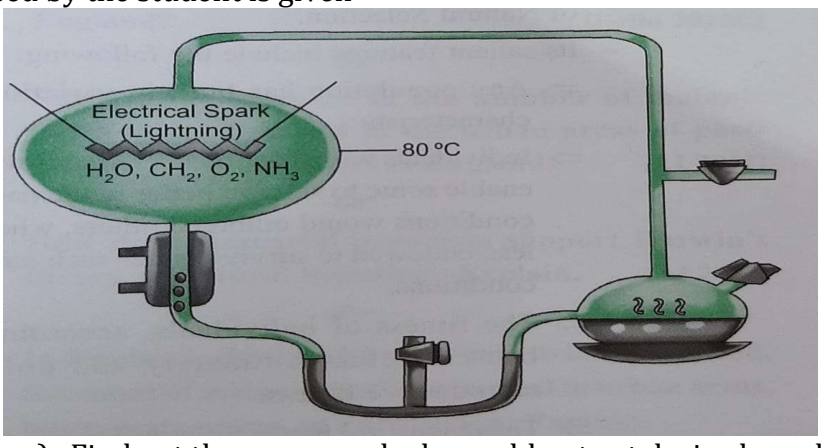
    OR

    How does a detrivore differ from a decomposer? Explain with one example of each.

SECTION – C

22. Name the male accessory glands in humans and write their function.
23. Name and explain the mechanism by which seeds from hybrid plants are developed that are able to retain the desired hybrid characters in the progeny?
24. Draw a schematic sketch of pBR 322 plasmid and label the following on it:
    a) Any two restriction sites
    b) Ori and rop genes
    c) An anti-biotic resistant gene.

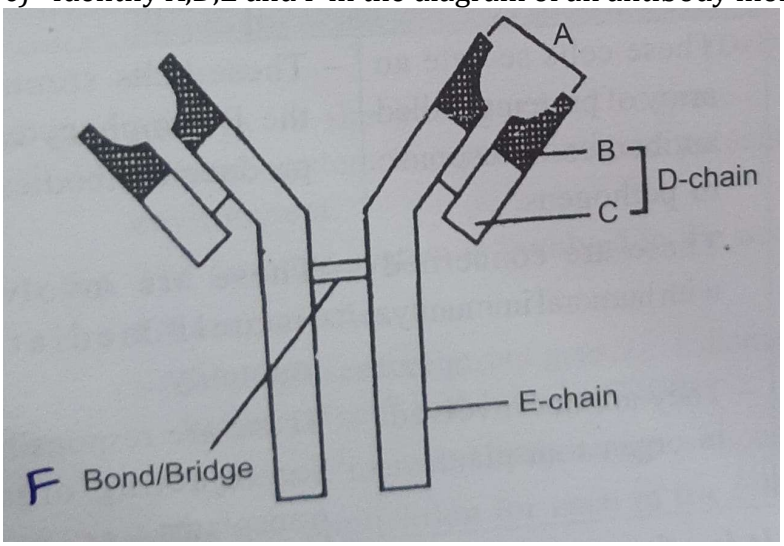
25. A student was simulating Urey and Miller's experiment to prove the origin of life. The used by the student is given-



    a) Find out the reasons why he could not get desired results?
       What conclusion was drawn by Urey and Miller through this experiment?
    b) Compare the conclusion drawn with the theory of spontaneous generation?

26. a) Why are cell-mediated and humoral immunities so called?

c) Identify A,D,E and F in the diagram of an antibody molecule given below:

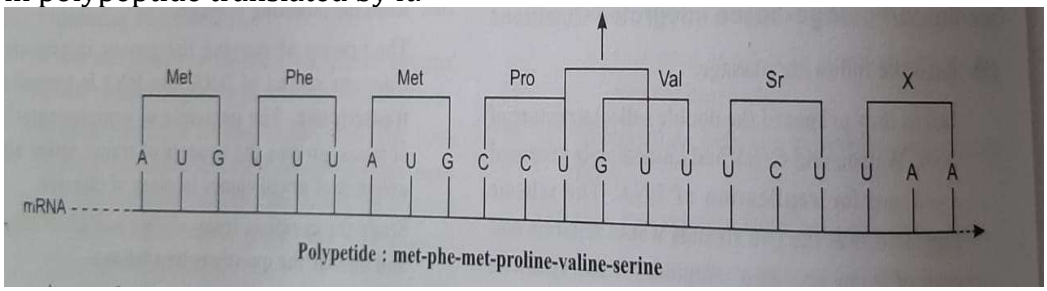


OR

Mention one application of each of the following:

a) Passive immunization
b) Anti-histamine
c) Cytokine barriers.

27. A mRNA is shown below. Read the sequence of nucleotides in it and the sequence of amino acids in polypeptide translated by it.



Answer the following questions based on it-

a) Write the sequence of nucleotides in template strand of DNA, along with its polarity, from which this mRNA has been transcribed.
b) If the three nucleotides shown by arrow in the above figure are deleted, what will be the sequence of amino acids in the new polypeptide translated?
c) What is the significance of the last codon X in the mRNA shown? Write two other codons of the same category.

28. Give three hypotheses for explaining why tropics show greatest levels of species richness.

SECTION-D

Q.no 29 and 30 are case based questions. Each question has subparts with internal choice in one subpart.

29. Given below is the representation of amino acid composition of the relevant translated portion of β-chain of hemoglobin, related to the shape of human red blood cells.

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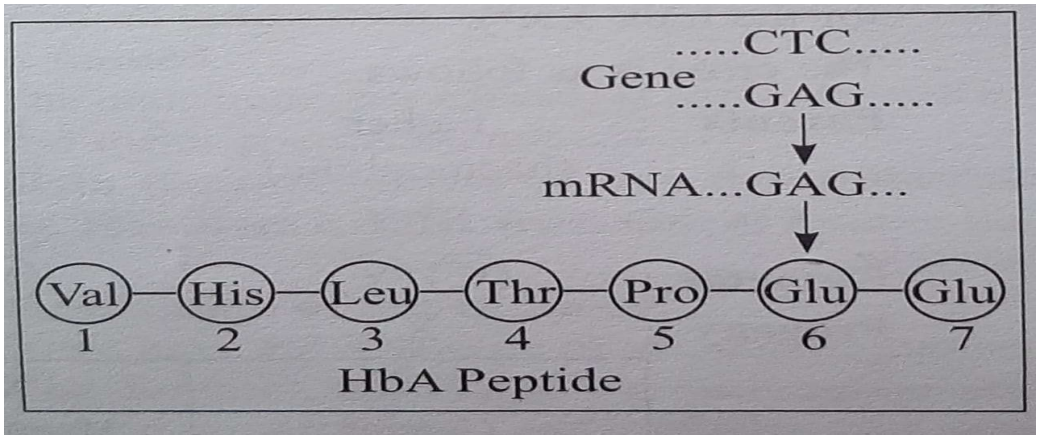


Answer the questions that follow:

a) Is the representation indicating a normal human or a sufferer from certain genetic disease? Give reason for your answer.
b) What difference would be noticed in the phenotype of the normal and the sufferer related to this gene?
c) Who are likely to suffer from the defect related to the gene represented- the males, the females or both males and females equally? And why?

OR

(c) Write the genotype of both parents who have produced a sickle-celled anaemic offspring.

30. Study a part of the life cycle of malarial parasite given below. Answer the questions that follow:
a) Mention the role of 'A' in the life cycle of the malarial parasite.
b) Name the event 'C' and the organ where this event occurs.
c) Identify the Organ 'B' and name the cells being released from it.

OR

(C) Name the host and the types of body cells where the asexual cycle of the parasite occur.

SECTION-E

31. Arrange the terms given below in their order of occurrence, briefly describing their structure and function in the early development of human embryo:
Implantation, Cleavage, Inner cell mass, Trophoblast, Blastomeres, Endometrium, Morula, Blastocyst.

OR

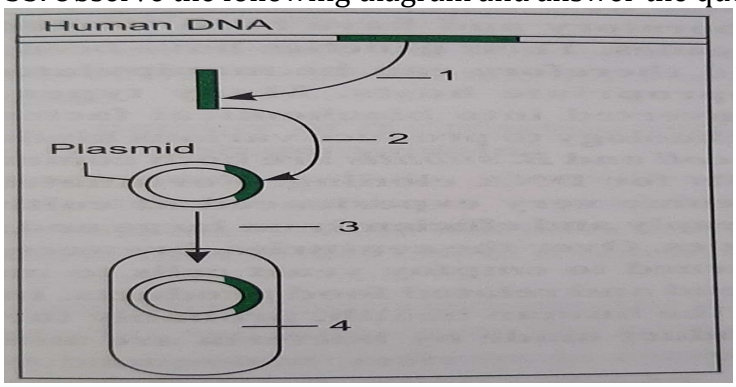
a) Differentiate between parthenocarpy and parthenogenesis. Give one example of each.
b) Explain any three advantages, the seed offers to angiosperms.

32. Explain with the help of Griffith's experiment, how the search for genetic material was conducted and what was his conclusion?

OR

a) Write any five salient features of the human genome as shown from the human genome
Project.
b) Briefly explain two methodologies which were involved in human genome project.

33. Observe the following diagram and answer the questions that follows:



a) Name the particular technique in biotechnology, whose steps are shown in the figure.
b) Name the steps 1 to 4 marked in the figure.
c) Name the enzyme involved in step 1 and 2.
d) Why are plasmids used in this process?
e) Give an example where a human gene product is obtained from a transgenic bacterium.

OR

Read the following passage and answer the questions that follow:

The diversity of rice in India is one of the richest in the world. There are an estimated 200,000 varieties of rice grown in India alone. Among these, Basmati is distinct for its unique aroma and flavour. In 1997, an American company got patent rights on Basmati rice, which allowed the company to sell a 'new' variety of Basmati in the U.S. and abroad.

a) How many documented varieties of Basmati rice are grown in India?
b) What is the 'new' variety of Basmati, developed by the U.S. company?
c) Name two other medicinal plants for which the MNCs have been attempting to get patents.
d) Name and define the term given to such unauthorised practices.
e) What has the Indian government done to prevent such deeds?

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Sample Question Paper (03) 2023-24
CLASS XII BIOLOGY (044)

MaximumMarks:70Time:3hours

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Wherever necessary, neat and properly labeled diagrams should be drawn.

SECTION–A

Q.No	Question	Marks
1.	Which of the following approaches does not give the defined action of contraceptive? a) Vasectomy - Prevents spermatogenesis b) Barrier methods - Prevent fertilization c) Intra-uterine devices - Increases phagocytosis of sperms, suppress sperm motility and fertilizing capacity of sperms d) Hormonal contraceptives - Prevent entry of sperms, prevent ovulation and fertilization	1
2.	The technique called Gamete Intra Fallopian Transfer (GIFT) is recommended for those females a) who cannot retain the foetus inside uterus b) who cannot produce an ovum c) who cannot provide suitable environment for fertilization d) all of these	1
3.	The base pairs of DNA double helix is given below. Select the suitable mRNA strand that derived from transcription is 31-ATTTCC-51 51-TAAAGG-31 a) UAAAGG b) CUUUCC c) GAAAGG d) CCUUUC	1
4.	Match the columns I and II- COLUMN I - COLUMN II a) Adaptive radiation - a) selection of resistant varieties due to excessive use of herbicides and pesticides	1

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	b) Convergent evolution - b)bones of four limbs in man and whale c) Divergent evolution - c)wings of butterfly and birds d) Evolution by anthropogenic action - d)Darwin finches choose the correct answers from the options given below- a b c d 1. ii I iv iii 2. I iv iii ii 3. Iv iii ii i 4. Iii ii I iv	
5.	The Presence of various Barriers in Innate immunity is to prevent of Pathogen entering through different corners in our body. Some of the cells represented are located in different barriers. Identify them according to their location. i)Skin ii) PMNL iii)Tears iv) Interferons v) Mucous a) i) and iii) – Physiological Barrier b) ii) and iv) – Cellular Barrier c) i) and v) -- Physical Barrier d) i) and iv) -- Cytokine Barrier	1
6.	Match the Column I AND II Column I Column II P) Malaria i) Plasmodium Q) Ringworm ii) Rhino virus R) Cold iii) Retrovirus S) AIDS iv) Filarial worm T) Elephantiasis v) Microspore a) P-i), Q- iii), R-ii), S-iv) , T-v) b) P-i) Q-iv) R-ii), S-iii) T-v) c) P-i), Q-v), R-ii), S-iii), T-iv) d) P-ii),Q-v) , R-iii), S-iv) , T-I)	1
7.	Identify the wrong pair: (a). Statin : Monascus, (b).Cyclosporin : Trichoderma (c.) Penicillin : Staphylococci, (d.)Ethanol : Yeast	1
8.	A cloning vector has two antibiotic resistance genes- for tetracycline and ampicillin. A foreign DNA was inserted into the tetracycline gene. Non recombinants would survive on the medium containing a) ampicillin but not tetracycline b) both tetracycline and ampicillin c) tetracycline but not ampicillin d) neither tetracycline nor ampicillin	1
9.	A biologist studied the population of rats in a barn. He found that the average natality was 260, average mortality 250, immigration 30 and emigration 40. The net increase in population is:	1

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	a) 05 b) Zero c) 10 d) 15	
10.	Carnivorous animals lions and leopards, occupy the same niche but lions predate mostly larger animals and leopards take smaller ones. This mechanism of competition is referred to as a) character displacement b) altruism c) resource partitioning d) competitive exclusion.	1
11.	Vertical distribution of different species occupying different levels represents: a) Productivity b) Standing crop c) Stratification d) Trophic level	1
12.	What is applicable to both Lantana and Eichhornia ? a) They are on the verge of extinction due to over-exploitation by humans. b) They are alien species that became invasive in certain environments causing threat to indigenous biodiversity. c) They are mutualists and likely to undergo co-extinction in recent future. d) They are keystone species and are vital to the stability of tropical ecosystems.	1
Question No. 13 to 16 consist of two statements – Assertion (A) and Reason (R). Answer thesequestions selecting the appropriate option given below: A. Both A and R are true and R is the correct explanation of A. B. Both A and R are true and R is not the correct explanation of A. C. A is true but R is false. D. A is False but R is true.		
13.	**Assertion**: As the seed matures, its water content is reduced and seeds become relatively dry (10-15% moisture by mass) **Reason**: Micropyle facilitates the entry of oxygen and water into the seed during germination. a) Both assertion and reason are true and the reason is the correct explanation of assertion. b) Both assertion and reason are true but the reason is not the correct explanation of assertion. c) Assertion is true but reason is false d) Both assertion and reason are false	1
14.	**Assertion:** Phenyl pyruvic acid is excreted through urine in case of phenylketonuria	1

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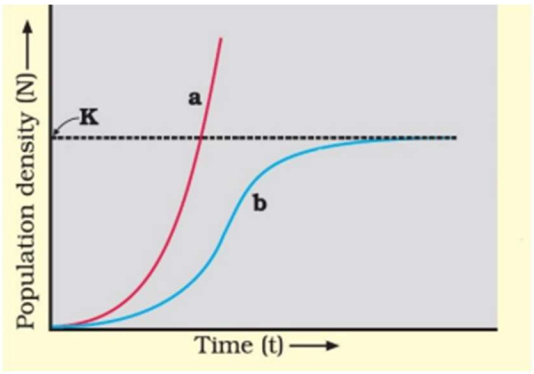
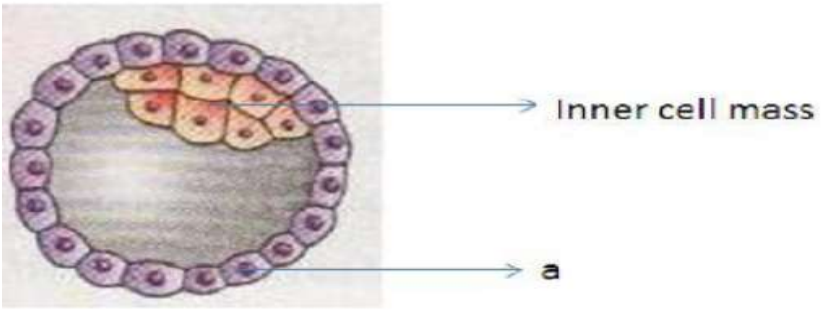
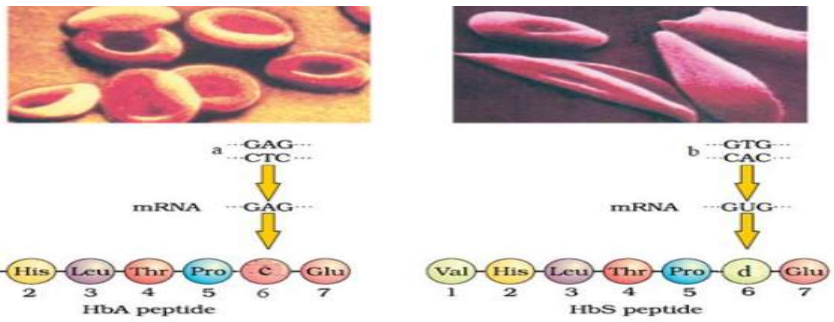
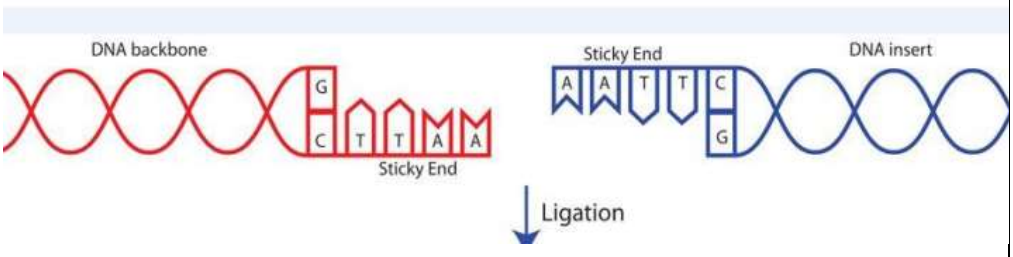
	Reason: The affected individual lacks enzyme phenylalanine hydroxylase. a) Both assertion and reason are true, and reason is the correct explanation of assertion. b) Both assertion and reason are true, but reason is not the correct explanation of assertion. c) Assertion is true but reason is false. d) Both assertion and reason are false	
15.	**Assertion**: The RNAi can be introduced in an organism by insertion of gene encoding complementary RNA only. **Reason**: There are no methods by which in vitro synthesized complementary RNA can be inserted in an organism to induce RNAÍ (RNA interference). a) Both assertion and reason are true, and reason is the correct explanation of assertion. b) Both assertion and reason are true, but reason is not the correct explanation of assertion. c) Assertion is true but reason is false. d) Both assertion and reason are false.	1
16.	Study the graph given below and answer the question that follow:  Assertion: The curve 'b' would depict the population of a species of deer if there are no predators in the habitat. Reason: Deer population will decrease because of competition among themselves for food. a) Both assertion and reason are true, and reason is the correct explanation of assertion. b) Both assertion and reason are true, but reason is not the correct explanation of assertion. c) Assertion is true but reason is false. d)Both assertion and reason are false.	1
SECTION–B		

17.	Study the given diagram and answer the questions-  a) Name the stage of human embryo the figure represents. b) Where are the stem cells located in this embryo? c) Write the name of "a" d) Which layer gets attached to the cells of endometrium and names the part which develops into embryo?	2
18.	Study the given diagram and answer the following questions-  a) Name disorder that is shown in the figure. b) How is this disorder inherited? c) What is the cause of this disease? d) Give one advantage of this disease.	2
19.	A farmer while working on his farm was bitten by a poisonous snake. The workers in the farm immediately rushed him to the nearby health centre. The doctor right away gavehim an injection to save his life. What did the doctor inject and why?	2
20.	Study the given diagram and answer the questions-  a) Name the restriction enzyme that recognizes this palindrome.	2

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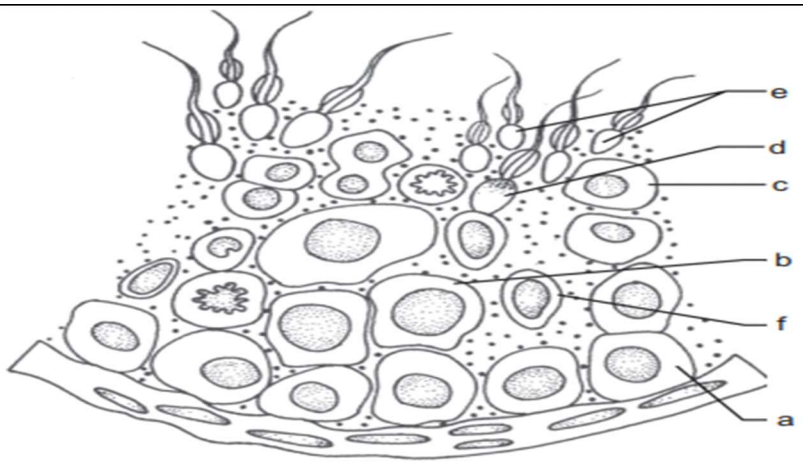
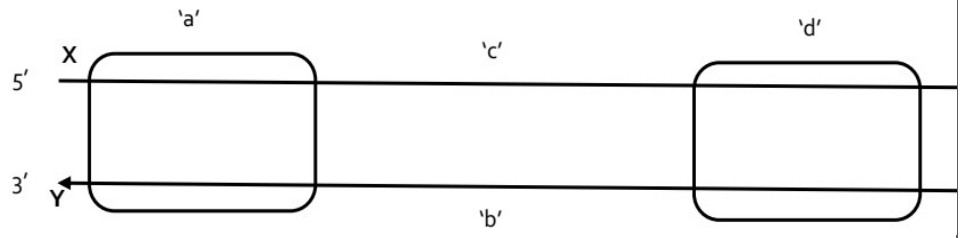
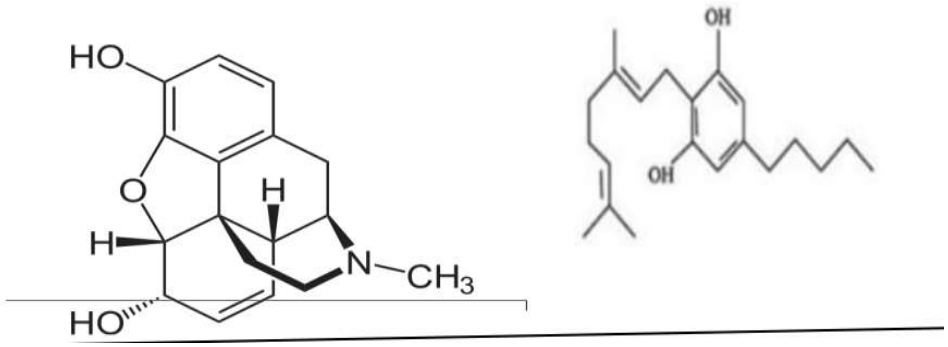
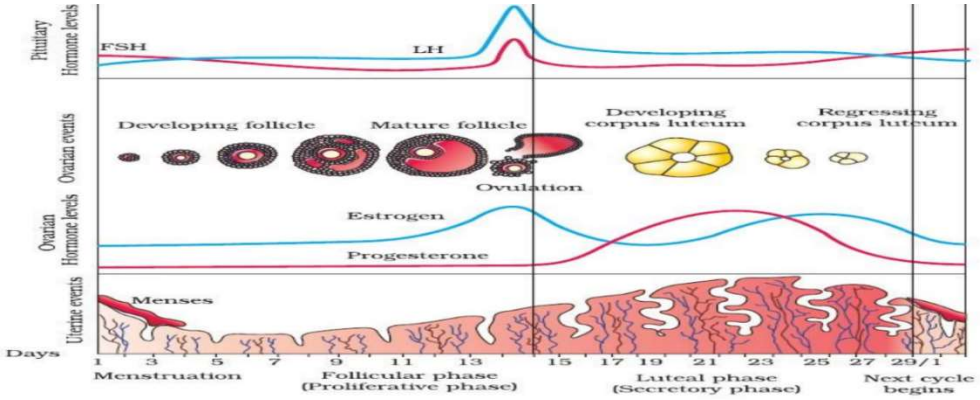
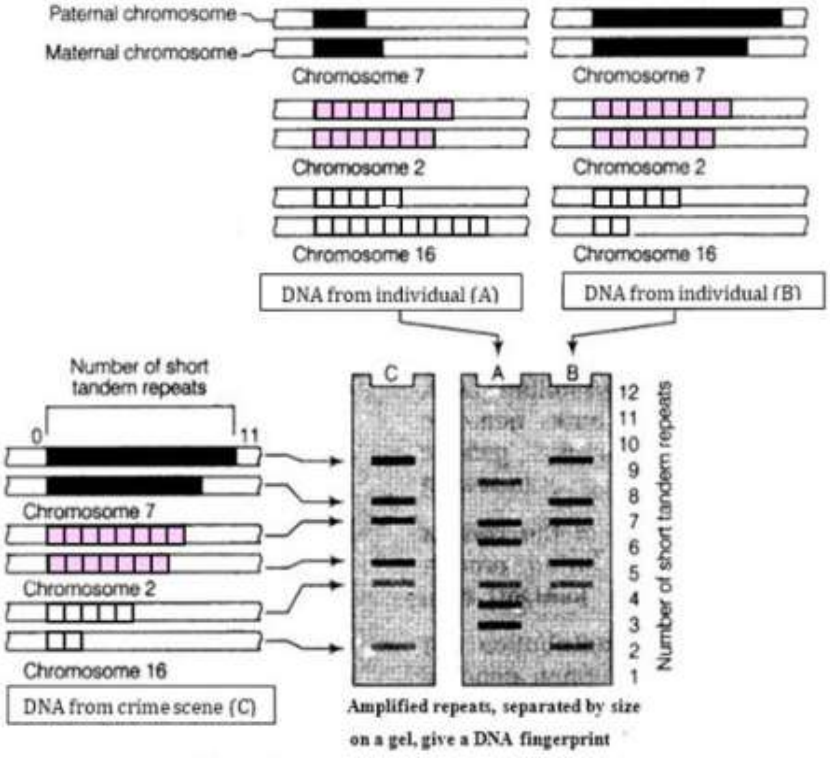
	b) Name the enzyme that link the DNA fragments.	
21.	Construct a pyramid of biomass starting with phytoplankton. Label three trophic levels. Is the pyramid upright or inverted? Why? **OR** What is primary productivity ? Why does it vary in different types of ecosystems? (ii) State the relation between gross and net primary productivity.	2
	SECTION–C	
22.	 Study the figure given and answer the questions : a) Pick out and name the cells that undergo spermiogenesis. b) Name 'b' and 'c' cells. What is the difference between them with reference to the number of chromosomes? c) How many spermatozoa will be produced from 50 primary spermatocytes?	3
23.	Majority of angiosperms have hermaphrodite flowers, but self-pollination is discouraged by them. Explain any three outbreeding devices that they have developed to achieve it.	3
24.	Study the following illustration and answer the questions below:  a) Considering that information from ***strand 'X'*** is to be *transcribed*, identify and name the parts labelled as „a", „b", „c" and „d". b) Explain the function of each of the labelled part. c) Name the enzyme involved in the process	3
25.	**S**tanley Miller and Harold Urey performed an experiment by recreating in the laboratory the probable conditions of the atmosphere of the primitive earth. a) What was the aim of the experiment?	3

	b) In what forms was the energy supplied for chemical reactions to occur? c) Which one of the following gases was not present in the atmosphere of primitive earth? d) Which compounds were used by Miller in his experiment for obtaining amino acids and other organic substances?	
26.	Observe the diagram – Figure. A Figure.  **OR** A person has been diagnosed as HIV positive. a) Name the test which the person underwent. b) Write full name of pathogen involved. Describe its structure. c) Which particular cells of this person are likely to get destroyed.	3
27.	a) How is mature insulin different from proinsulin secreted by pancreas in humans? b) Explain how was human functional insulin produced using rDNA technology. c) Why is the functional insulin thus produced considered better than the ones used earlier by diabetic patients?	3
28.	List three reasons that account for the greater biological diversity in tropics.	3
	SECTION–D	
Q.no 29 and 30 are case based questions. Each question has subparts with internal choice in one subpart.		
29.	Hemophilia is a rare type of bleeding disorder that occurs when there is a deficiency or absence of a particular protein (clotting factor) needed for blood to clot. As a result, a person with hemophilia will experience longer bleeding after an injury because the clot formed is not strong enough to stop the bleeding. A person with hemophilia will not bleed any faster than a person without hemophilia, but he or she will bleed slower and longer. This type of bleeding disorder is inherited and occurs almost exclusively in males. A cross between a normal couple resulted in a son who was hemophilic and a normal daughter. In course of time, when the	4

	daughter was married to a normal man, to their surprise, the grandson was also hemophilic. a) Represent this cross in the form of a pedigree chart. Give the genotypes of the daughter and her husband. b) Write the conclusion you draw of the inheritance pattern of this disease. c) Why is hemophilia generally observed in human males? **OR** c) Explain the conditions under which a human female can be hemophilic.	
30.	a) Cancer is one of the most dreaded diseases. Explain 'Contact inhibition' and 'Metastasis' with respect to the disease. b) Name the group of genes that have been identified in normal cells that could lead to cancer. How do these genes cause cancer? c) Name any two techniques that are useful in detecting cancers of internal organs. d) Why are cancer patients often given α-interferon as part of the treatment? **OR** d) What is the basis of classifying cancer? Name the different categories of cancer.	4
	SECTION–E	
31.	Observe the following diagram and answer the questions given below  a) Why is follicular phase also known as proliferative phase? b) What happens to corpus luteum if pregnancy does not occur? c) What ovarian changes take place during luteal phase? d) At what time of Menstrual cycle LH surge occurs? e) What are the uterine changes that occur during menstrual phase? **OR** How does the megaspore mother cell develop into a mature embryo sac in an angiosperm? Explain with diagrams.	5
32.	Two blood samples of suspects „A" and „B" were sent to the Forensic Department along with the sample „C" from the crime scene. The Forensic Department assigned the responsibility of running the	5

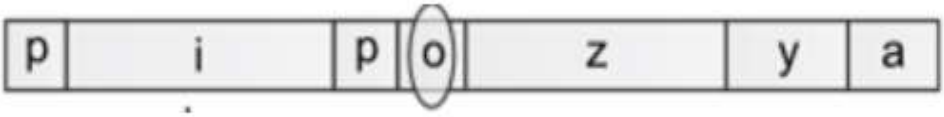
samples and matching the samples of the suspects with that of the sample from the scene of the crime and thereby identify the culprit.



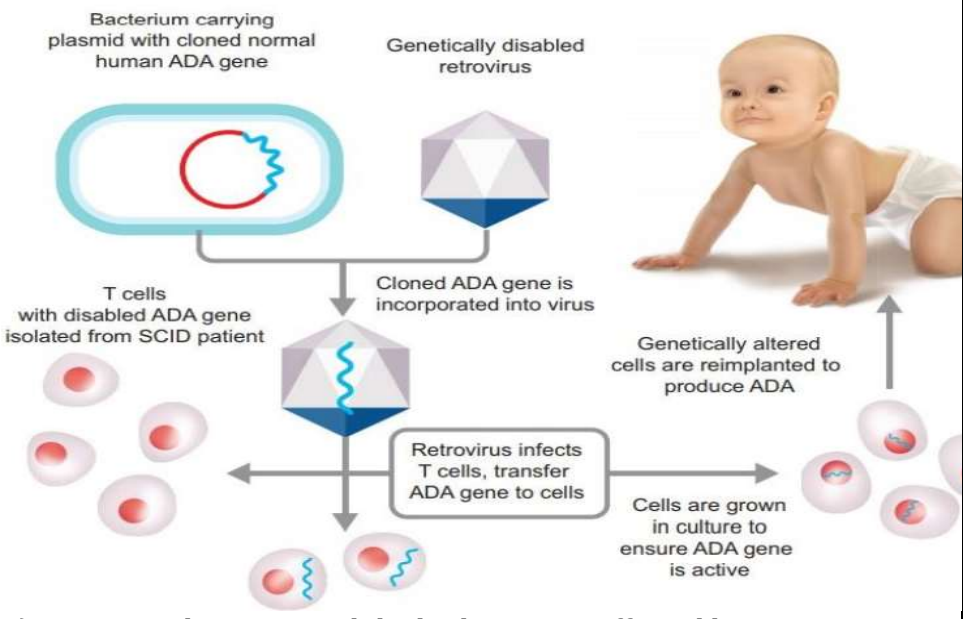
a) What is the meaning of Probe in genetic fingerprinting.
b) What is the difference between minisatellite and microsatellite in relation to DNA Fingerprinting.
c) How does polymorphism arise in a population?
d) State the steps involved in DNA Fingerprinting in a sequential manner.

OR

(a) Study the schematic representation of the genes involved in *lac operon* given below and answer the questions that follow:



a) Identify and name the regulatory gene in this operon. Explain its role in *„switching off"* the operon.
b) Why is the *lac operon's* regulation referred to as *„negative regulation"*?
c) Name the inducer molecule and the products of the genes" *„z"* and *„y"* of the operon. State the functions of these gene products

33.	**Read the following and answer the questions that follows:**  a) Mention the cause and the body system affected by ADA deficiency in humans b) Name the vector used for transforming ADA-DNA into recipient cells in humans. Name the recipient cells. c) Explain enzyme replacement therapy to treat adenosine deaminase deficiency. Mention two disadvantages of this procedure. **OR** Insulin is responsible for how the body processes sugar. The body's cells need to have sugar for energy but this sugar can't enter them directly. So, **after you eat food and your blood sugar increases**, cells in the pancreas release insulin into the bloodstream. This hormone attaches itself to cells and "tells" them to absorb sugar from the blood. But it also has some other interesting functions. a) Name the source from which insulin was extracted earlier. Why is this insulin no more in use by diabetic people? b) Explain the process of synthesis of insulin by Eli Lilly company. Name the technique used by the company. c) How is insulin produced by human body different from the insulin produced by the above mentioned company.	5

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Sample Question Paper (04) 2023-24

CLASS XII

BIOLOGY (044)

Maximum Marks: 70 **Time: 3 hours**

General Instructions:

(i) *All questions are compulsory.*

(ii) *The question paper has five sections and 33 questions. All questions are compulsory.*

(iii) *Section–A has 16 questions of 1 mark each; Section–B has 5 questions of 2 marks each; Section– C has 7 questions of 3 marks each; Section– D has 2 case-based questions of 4 marks each; and Section–E has 3 questions of 5 marks each.*

(iv) *There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.*

(v) *Wherever necessary, neat and properly labeled diagrams should be drawn.*

SECTION – A

Q.No.	Question	Marks
1.	Which of the following is correct about human Reproduction? (a) 'Saheli' is a new contraceptive for males (b) Amniocentesis is carried out to know the chromosomal pattern from the sample taken from the cells of umbilical cord. (c) Ovulation is facilitated by breast-feeding (d) A combination of progesterone and oestrogen is injected or implanted under the skin as an effective contraceptive	1
2.	Given below are four methods (A–D) and their modes of action (a–d) in achieving contraception. Select their correct matching from the four options that follow	

	Method		Mode of Action
A	The pill	a	Prevents sperms reaching cervix
B	Condom	b	Prevents implantation
C	Vasectomy	c	Prevents ovulation
D	Copper T	d	Semen contains no sperms

Matching:

(1) A – (c), B – (d), C – (a), D – (b)

(2) A – (b), B – (c), C – (a), D – (d)

(3) A – (c), B – (a), C – (d), D – (b)

(4) A – (d), B – (a), C – (b), D – (c)

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<table>
<tr><td>3.</td><td>If there are 10,000 nitrogenous base pairs in a DNA then how many nucleotides are there
(1) 500 (2) 10,000
(3) 20,000 (4) 40,000</td><td>1</td></tr>
<tr><td>4.</td><td>Adaptive radiation refers to :
(1) Adaptations due to Geographical isolation
(2) Evolution of different species from a common ancestor
(3) Migration of members of a species to different geographical areas
(4) Power of adaptation in an individual to a variety of environments</td><td>1</td></tr>
<tr><td>5.</td><td>Immune system retains the memory of which response in vaccination process:
(1) Passive immunization response
(2) Primary immune response
(3) Secondary immune response
(4) All the above</td><td>1</td></tr>
<tr><td>6.</td><td>Toxin which is responsible for chill and high fever during malaria:
(1) Haematin (2) Hemoglobin
(3) Haemozoin (4) Heam</td><td>1</td></tr>
<tr><td>7.</td><td>Match the following list of microbes and their importance:
<table>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>a</td><td>Saccharomyces cerevisiae</td><td>(i)</td><td>Production of immunosuppressive agents</td></tr>
<tr><td>b</td><td>Monascus purpureus</td><td>(ii)</td><td>Ripening of Swiss cheese</td></tr>
<tr><td>c</td><td>Trichoderma polysporum</td><td>(iii)</td><td>Commercial production of ethanol</td></tr>
<tr><td>d</td><td>Propionibacterium sharmanii</td><td>(iv)</td><td>Production of blood cholesterol lowering agents</td></tr>
</table>
(a) (b) (c) (d)
(1) (iii) (i) (iv) (ii)
(2) (iii) (iv) (i) (ii)
(3) (iv) (iii) (ii) (i)
(4) (iv) (ii) (i) (iii)</td><td>1</td></tr>
<tr><td>8.</td><td>The figure below shows three steps (A, B, C) of Polymerase Chain Reaction (PCR). Select the option giving correct identification together with what it represents?</td><td>1</td></tr>
</table>

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	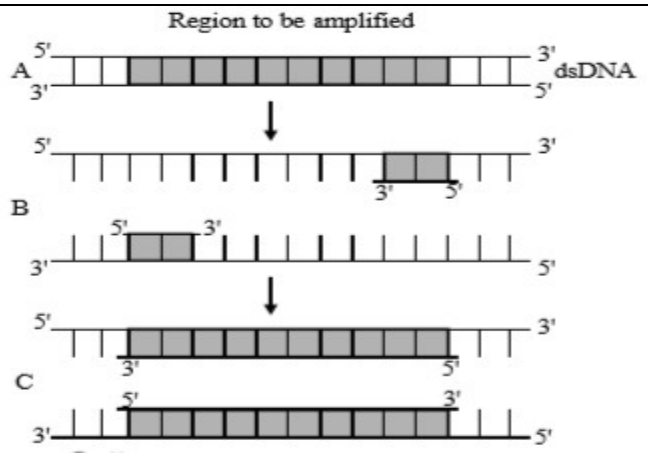 Options: (1) C-Extension in the presence of heat stable DNA polymerase (2) A-Annealing with two sets of primers (3) B-Denaturation at a temperature of about 98°C separating the two DNA strands (4) A-Denaturation at a temperature of about 50°C	
9.	Gause's principle of competitive exclusion states that: (1) More abundant species will exclude the less abundant species through competition. (2) Competition for the same resources excludes species having different food preferences. (3) No two species can occupy the same niche indefinitely for the same limiting resources. (4) Larger organisms exclude smaller ones through competition.	1
10.	Competition for food, light and space is most severe in (1) Closely related species growing in the same area (in the same niche) (2) Closely related species growing in different habitat (3) Distantly related species growing in the same habitat (4) Distantly related species growing in different habitat	1
11.	Gross primary productivity is (1) Rate at which organic molecules are formed in an autotroph (2) Rate at which organic molecules are used up by an autotroph (3) Storage of organic molecules in the body of an autotroph (4) Rate at which organic molecules are transferred to next higher trophic level	1
12.	A location with luxuriant growth of lichens on the trees indicates that the: (1) Trees are very healthy (2) Trees are heavily infested (3) Location is highly polluted (4) Location is not polluted	1
	Question No. 13 to 16 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below: A. Both A and R are true and R is the correct explanation of A. B. Both A and R are true and R is not the correct explanation of A.	

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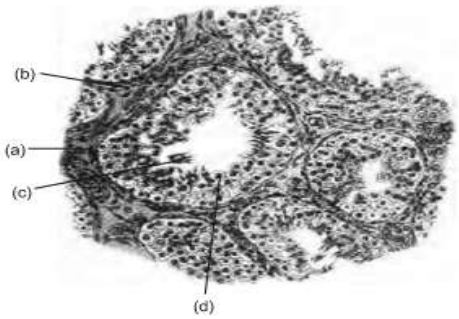
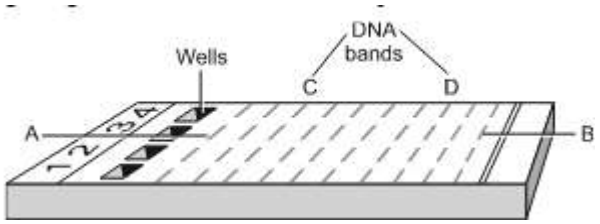
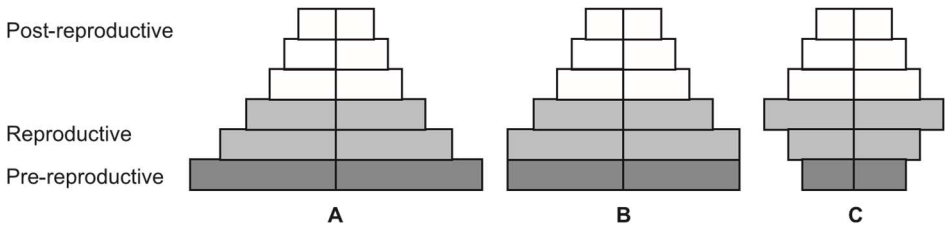
	C. A is true but R is false. D. A is False but R is true. E. Both the Assertion and Reason are false.	
13.	Assertion: - In monoecious plants neither autogamy nor geitonogamy can be observed. Reason: - In monoecious plants male and female flowers produce on different plants.	1
14.	Assertion: - In birds, the females have one Z and one W chromosome, whereas male have a pair of Z-chromosomes besides autosomes. Reason: - In birds, sex of the offspring's is decided by the temperature of surroundings when they are released.	1
15.	Assertion- In gene therapy of SCID, a patient requires periodic infusion of genetically engineered lymphocytes. Reason: - If the ADA gene is introduced into cells at early embryonic stage, it could be a permanent cure.	1
16.	Assertion: - Decomposition is one of the most vital functional attributes of ecosystem. Reason: - It helps in breakdown of organic complex matter and loosening of soil as well.	1
	SECTION – B	
17.	Study the sectional view of human testis showing seminiferous tubules given below. Answer the questions that follow.  i. Identify a, b and c. ii. Write the functions of a and d.	2
18.	In a dihybrid cross white eyed, yellow bodied female *Drosophila* crossed with red eyed, brown bodied male *Drosophila* produced in F_2 generation 1.3 per cent recombinants and 98.7 per cent progeny with parental type combinations. This observation of Morgan deviated from Mendelian F_2 phenotypic dihybrid ratio. Explain, giving reasons, Morgan's observations.	2

19.	Explain the role of the following in providing defense against infection in human body: (i) Histamines (ii) Interferons	2
20.	Study the diagram given below and answer the questions that follow:  (i) Why have DNA fragments in band 'D' moved farther away in comparison to those in band 'C'? (ii) Identify the anode end in the diagram. (iii) How are these DNA fragments visualized?	2
21.	Study the three different age pyramids for human population given below and answer  (a) Write the names given to each of these age pyramids. (b) Mention the one which is ideal for human population and why. OR (*a*) Draw a 'pyramid of numbers' of a situation where a large population of insects feed upon a very big tree. The insects in turn, are eaten by small birds which in turn are fed upon by big birds. (*b*) Differentiate giving reason, between the pyramid of biomass of the above situation and the pyramid of numbers that you have drawn.	2
	SECTION-C	
22.	Write the function of each of the following: 1. Middle piece in human sperm. 2. Tapetum in anthers.	3

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	3. Luteinizing hormone in human males.	
23.	(*a*) Draw a diagram of a mature embryo sac of an angiosperm and label the following parts in it: i. Filiform apparatus ii. Egg cell iii. Polar nuclei iv. Antipodal	3
24.	(*a*) Construct a complete transcription unit with promoter and terminator on the basis of the hypothetical template strand given below:  (*b*) Write the RNA strand transcribed from the above transcription unit along with its polarity.	3
25.	With the help of any two suitable examples explain the effect of anthropogenic actions on organic evolution.	3
26.	Identify the examples of homologous structures from the following: (i) Vertebrate hearts (ii) Thorns in *Bougainvillea* and tendrils of *Cucurbita*. (iii) Food storage organs in sweet potato and potato. OR A young boy when brought a pet dog home started to complain of watery eyes and running nose. The symptoms disappeared when the boy was kept away from the pet. (i) Name the type of antibody and the chemicals responsible for such a response in the boy. (ii) Mention the name of any one drug that could be given to the boy for immediate relief from such a response.	3
27.	*a*) Explain the role of *Eco*RI in the formation of recombinant DNA. *b*) Explain insertional inactivation used in the selection of recombinants in biotechnology experiments.	3
28.	Draw and explain a logistic curve for a population of density (N) at time (t) whose intrinsic rate of natural increase is (r) and carrying capacity is (k).	3

	SECTION-D	

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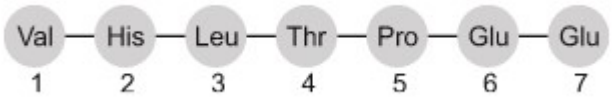
	Q.no 29 and 30 are case based questions. Each question has subparts with internal choice in one subpart.	
29.	A relevant portion of β- chain of hemoglobin of a normal human is given below  (i) The codon for the sixth amino acid is GAG. The sixth codon GAG mutates to GAA as a result of mutation 'A' and into GUG as a result of mutation 'B'. Hemoglobin structure did not change as a result of mutation 'A' whereas hemoglobin structure changed because of mutation 'B' leading to sickle shaped RBCs. Explain giving reasons how could mutation 'B' change the hemoglobin structure and not mutation 'A'. (ii) Write the symptoms of sickle-cell anaemia in humans. OR Write the genotype of (i) an individual who is carrier of sickle cell anaemia gene but apparently unaffected, and (ii) an individual affected with the disease.	4
30.	A person in your colony has recently been diagnosed with AIDS. People/residents in the colony want him to leave the colony for the fear of spread of AIDS. a. Write your view on the situation, giving reasons. b. List the possible preventive measures that you would suggest to the residents of your locality in a meeting organized by you so that they understand the situation. OR Write the symptoms and the causative agent of AIDS.	
31.	(a) Given below is the T.S. of human ovary. Identify the following in the diagram:	5

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	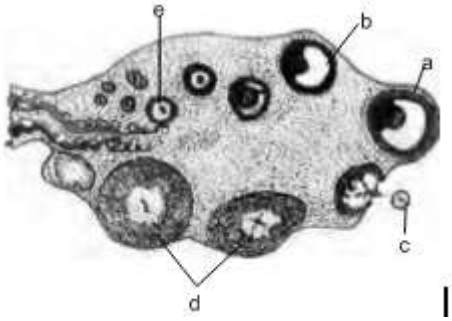 (i) Corpus luteum (ii) Secondary oocyte (iii) Antrum (iv) Primary follicle (v) Primary oocyte (b) Explain the changes the primary oocyte undergoes while in different follicular stages before ovulation. OR a. Trace the development of embryo after syngamy in a dicot plant. b. Endosperm development precedes embryo development. Explain. c. Draw a diagram of a mature dicot embryo and label cotyledons, plumule, radicle and hypocotyl in it.	
32.	(a) What did Meselson and Stahl observe when i. they cultured *E. coli* in a medium containing $^{15}NH_4Cl$ for a few generations and centrifuged the content? ii. they transferred one such bacterium to the normal medium of NH_4Cl and cultured for 2 generations? iii. What did Meselson and Stahl conclude from this experiment? Explain with the help of diagrams. (b) Which is the first genetic material? Give reasons in support of your answer OR wo blood samples A and B picked up from the crime scene were handed over to the forensic department for genetic fingerprinting. (i) Describe how the technique of genetic fingerprinting is carried out. (ii) How will it be confirmed whether the samples belonged to the same individual or to two different individuals	5

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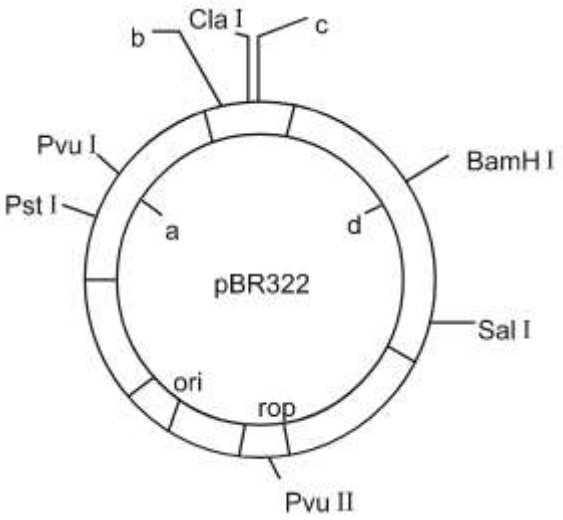
33.	 a. Identify the selectable markers in the diagram of *E. coli* vector shown above. b. How is the coding sequence of a-galactosidase considered a better marker than the ones identified by you in the diagram? Explain. OR a) Mention the role of vectors in recombinant DNA technology. Give any two examples. (b) With the help of diagrammatic representation only, show the steps of recombinant DNA technology.	5