ROLL NO.									

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PRE-BOARD-2 EXAMINATION (2025-26) (SET-1)

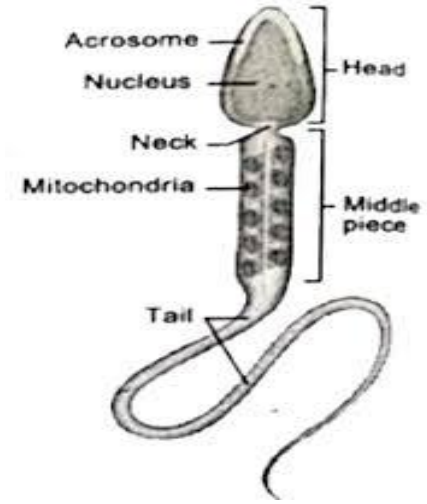
CLASS: XII MAX.MARKS:70

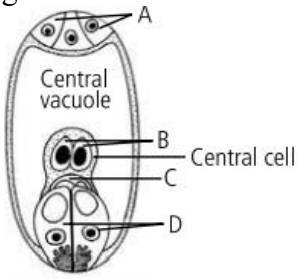
SUBJECT: BIOLOGY (044) TIME: 3 HOURS

General Instructions

1. All questions are compulsory.
2. The question paper has five sections and 33 questions.
3. 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.
4. 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.
5. Wherever necessary, neat and properly labeled diagrams should be drawn.

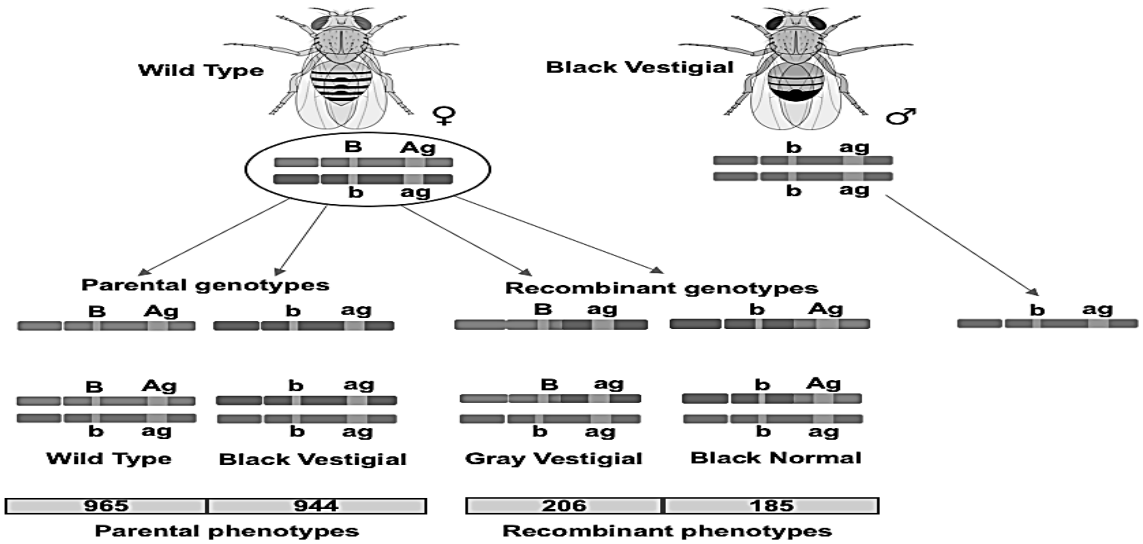
Section – A

Q.No.	Questions	Marks
1	Analyze the diagram of a sperm.  **(Diagram of a sperm cell with labels for head, neck, midpiece, and tail)** If the structure labeled 'mid-piece' is somehow damaged, what function will be most immediately and significantly impacted? A. The sperm will be unable to fertilize the ovum by releasing enzymes from the acrosome. B. The sperm will be unable to move towards the ovum due to the loss of its primary locomotive force. C. The sperm will be unable to fuse with the ovum's plasma membrane. D. The sperm will be unable to penetrate the corona radiata and zona pellucida.	1

2	Study the following figure andfill the blanks with the correction combination/option  1. Death of " D" will lead to……(I)…… 2. The "C" and "D" are labeled as……(II)……and…(III)……. Respectively. 3. The"B" is tripled and nourishes to……IV)…….. to become……(V).…… 4. Nourishment to develop a cell in to embryo sac structure is provided by……VI…….. **Chose the correct option**	1

	I	II	III	IV	V	VI
A	No fertilization	Egg	Synergid	zygote	embryo	nucellus
B	No fertilization	Egg	Synergid	embryo	zygote	nucellus
C	No fertilization	Egg	Synergid	nucells	embryo	zygote
D	No fertilization	Egg	Synergid	zygote	nucellus	embryo

3	Select the odd one from the following matches A. Copper-T: Release Cu++ which kill the sperms B. Multiload-375: Release Cu++ which reduced the sperm motility and prevents implantation. C. Vasectomy: Sterilization of males D. Tubectomy: Non-ideal contraception	1
4	In a population of 1000 individuals, the frequency of individuals **showing a recessive traits** (homozygous recessive, *aa*) is observed to be 9% (consider that the population is breeding randomly). Using Hardy-Weinberg equation, frequency of heterozygous population will be: A. 0.3 B. 0.042 C. 0.09 D. 0.42	1
5	In a diploid human cell, number of Nucleosome units are roughly calculated as: A. $6.6x10^8/200$ B. $6.6x10^9/0.34$ C. $6.6x10^9/100$ D. $6.6x10^9/200$	1
6	DNA fingerprinting techniques does not involve: A. Identification of VNTRs B. Hybridization of DNA with DNA probe C. Western blotting D. Autoradiography	1
7	A genetic disorder which is expressed commonly in males, only females are carrier, skips generation can be: A. Color blindness B. Sickle cell anemia C. Hemophilia D. Both a and c	1

8	 the above shown figure represents: A. Gene linkage B. Deviation from F_2 di-hybrid phenotype ratio C. Deviation from law of segregation D. Both a and b	1
9	…(a)…. is fermented by LAB to form ….(b)…. which is rich in … (c)…. *Lactobacillus* converts …(d)…….sugar to …(e)….. acid during fermentation process. (a) / (b) / (c) / (d) / (e) A: protein / cheese / alcohol / glucose / Minerals B: Chees / Yogurt / Vitamin–B12 / lactose / lactic C: Milk / Yogurt / Minerals / lactose / Vitamin C D: Milk / Curd / Vitamin-B12 / lactose / Lactic	1
10	In which of the following the BOD (Biochemical Oxygen Demand) of sewage (S), distillery (fermentation and distillation factory) effluent (DE), paper mill effluent (PE) and sugar mill effluent (SE) have been arranged in ascending order: A. SE<PE<S<DE B. PE<S<SE<DE C. S<DE<PE<<SE D. SE<S<PE<DE	1
11	Which of the following is sourced from archaebacteria and serving for modern biotechnology: A. Statin B. *Taq* polymerase C. DNA dependent DNA polymerase III D. Primase	1
12	Common types of cry gene isolated from *Bacillus thurengiensis* include cryIAc, cryIIAb and cryIAb used to produce genetically modified plants. Which cry gene is used to protect from corn bores? A. cryIAc and cryIIAb B. cryIAc C. cryIAb, cryIIAb D. cryIAb	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. C. A is true but R is false. D. A is False but R is true.		
13	**Assertion**: Trisomy of 21st chromosome causes Down's Syndrome in human. **Reason**: Karyotype of persons with Down's Syndrome can be expressed as 45Autosomes + XY/XX	1
14	**Assertion**: Okazaki fragments are formed in lagging strand during semiconservative DNA replication. **Reason:** The DNA dependent DNA polymerase-III reads 3' prime to 5' prime template DNA and synthesis the new strand in 5' prime to 3' prime only.	1
15	**Assertion:** Anamnestic immune response is vigorous and fast, is a type of passive immunity. **Reason**: Anamnestic immune response is based on performance of pre-prepared antibodies in the body and memory cells.	1
16	**Assertion (A):** The acrosome of a sperm contains enzymes. **Reason (R):** These enzymes help the sperm to penetrate the zona pellucida of the ovum.	1
	Section-B	
17	**Attempt either option A or B.** **A.** (i) The diagram of the cheese shown below is produced by a certain bacterium. Name it. How does it create the large holes?  (ii) Where are B-cells and T-cells formed? How do they differ from each other? **OR** **B**. Identify the pathogen and disease on the basis of symptoms/diagnostic results in the followng cases" a. Perforated gut and continuos constant fever b. Affeted and swellen lower lyphatic nodes. c. Low RBCs count and hight alternating fever d. Low T-cell count and multiple symptoms/system infection	2
18	A pathogen in tobacco plant roots was controlled using dsRNA (double stranded RNA) approach of biotechnology. Name the pathogen and write down the steps of RNA silencing technology.	2
19	How the life originated on the Earth? Give the experimental proof in support.	2
20	**Attempt either option A or B.** A. Biomass of a standing crop of phytoplankton is 4kg / m² which supports a large standing crop of zooplankton having a biomass 11 kg/m². This is consumed by small fishes having biomass 25kg/m² which are then consumed by large fishes with the biomass 37 kg/m². -Draw an ecological pyramid indicating the biomass at each stage and also name the trophic levels. Mention whether it is an upright or inverted pyramid. **OR** B. Draw a simple grazing food chain and mention the amount of energy at different trophic level of food chain if the producers are getting 1000000 kJ of photo synthetically active	2

radiation (PAR) at time (consider the efficiency of plants to utilize PAR is 5%).

21 **Attempt either option A or B.** 2

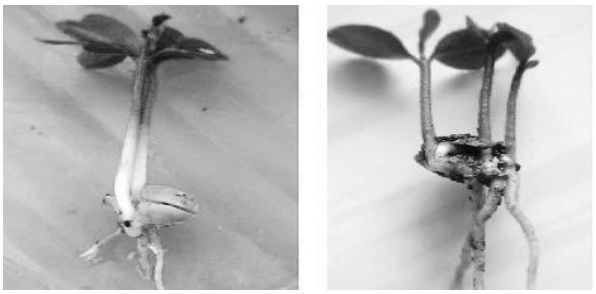
A. Given below are certain situations. Analyse the situation and suggest the name of suitable contraceptive device along with mode of action.

Situation	Requirement of contraceptive	Name of contraceptive device	Type of contraceptive method
1	blocking the entry of sperms through cervix		
2	irreversible method to prevent any more pregnancy in female		

OR

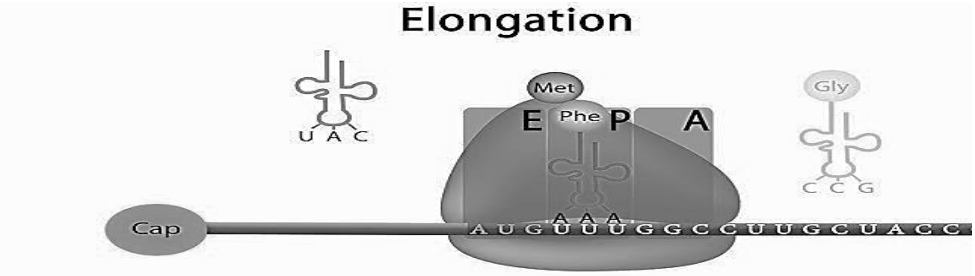
B.A farmer shown single seed in two cases and observer the results as shown in both figures.

a. Mention the phenomenon and reason behind its.
b. Can it help to reduce the cost of farming? How if yes?



Section-C

22 3



1. What will be the possible sequence of anticodon on tRNA for the 6th codon in the above mRNA sequence?Mention any sequence after 6th codon which breaks polypeptide chain with reason.
2. If the sequence of a given mRNA below is as:

5'-CCUAUG AUG CCU UCC CCC UUU GGG UAG CCU-3'

is translated then,

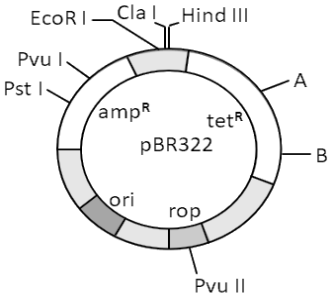
Identify the first amino acid in a mature protein and total number of amino acid residues in the protein produced by translation of this sequence.

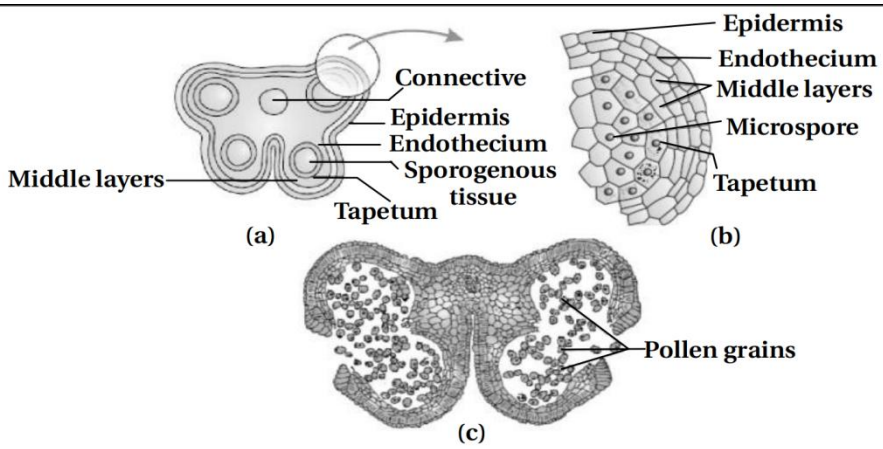
3. What is "cap" in the given mRNA? Identify whether given mRNA generally represents Eukaryotes or Prokaryotes.

23 3

Analyze the following situation and provide justified answers

a. Can anyone use human excreta and cow dung on anaerobic chamber without passing from the aerobic digestion for the Biofuel production? Justifiy
b. Can you suggest the product of *Monuscus perpurious* and *Streptocuccus* to deal with blood related medical problems? Why
c. How the use of Anabena, Nostoc, Mycorriza, and Nitrobector can improve soil helath

	in farming and can reduce the farming cost?	
24	A. Sometimes traits expressed in F1 generation are not the dominant traits. Justify with one example. B. What are true line/pure line breeder? How Mendel could identify pure line and hybrid plants?	3
25	A plasmid vector, pBR322 is presented in the following figure. This plasmid can be restricted at the specific site by restriction endonuclease enzymes such as EcoRI .Study it and answer the following queries.  1. Mention any specific sequence and term used for such sequence at the restriction site in double stranded plasmid. 2. If ter® is selected as cloning site, what will be the response of transformed cells in culture medium containing tetracycline antibiotic and why? 3. How rDNA is inserted in host cell? Mention any two methods.	3
26	Answer the following 1. Explain the role of predators as "Conduits of energy" and controller of population density of prey population in an ecosystem. 2. How resource partitioning promotes co-existence to avoid Competitive exclusion? Give one example. 3. During the course of evolution, the eggs of the parasitic bird have evolved to resemble the host's egg in size and color to reduce the chances of the host bird detecting the foreign eggs and ejecting them from the nest. Name the interaction and its example.	3
27	A couple reported the gynecologist about the inability to produce babies 5 years after marriage. The doctor examined the physical and physiological state of the couple and found that: both fallopian tubes were blocked but uterus was healthy, the sperm count was significantly high with defective tails. The couple wants their own biological child. a. Which ART a doctor should suggest to the couple and why? b. Should the doctor go for ICSI? Why? c. What is AI and IUI? A couple reported the gynecologist about the inability to produce babies 5 years after marriage. The doctor examined the physical and physiological state of the couple and found that: both fallopian tubes were blocked but uterus was healthy, the sperm count was significantly high with defective tails. The couple wants their own biological child.	3
28	Study the given figures a, b and c of an angiosperm anther section and solve the question asked below:	3



1. Consider that all the male gametophytes are fully mature in 'figure-c'. How many cells will it contain? Write their names and ploidy.
2. Some cells in 'figure-b'undergo mitosis, only karyokinesis takes place but cytokines did not. Name the cellsand mention what will be the consequences if theses cell are defective in function.
3. All the pollen fall on to the stigma germinate and fertilize the ovule. Do you agree? Justify your view.

Section- D: Case based Question

29 A team of Class XII students was tasked with studying pollination mechanisms in flowering plants for a biology exhibition. They visited a botanical conservatory and observed different types of flowers. Their guide pointed out **cleistogamous flowers** that never open and still undergo successful pollination, and other flowers that required external agents like bees and wind for pollination. 4

The students learned that:

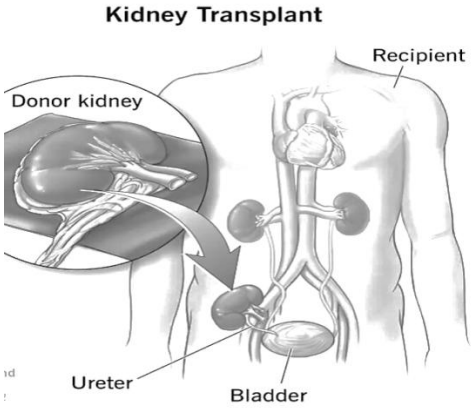
- **Autogamy** ensures reproductive assurance but limits genetic variation.
- **Xenogamy**, though dependent on pollinators, introduces genetic variability and hybrid vigor.
- Some flowers have evolved special adaptations like **chasmogamy**, **herkogamy (longer style)**, and **dichogamy (non-synchrony)** to promote cross pollination or to avoid self-pollination.

They were intrigued by how some plant species ensure autogamy through structural mechanisms while others promote xenogamy to ensure better adaptability and survival.

Answer the following questions:

1. Which of the following conditions is essential for autogamy?
   A. Pollen release before stigma receptivity
   B. Synchrony in pollen release and stigma receptivity
   C. Large distance between anthers and stigma
   D. Presence of nectar-producing glands

2. Cleistogamy promotes autogamy because:
   A. It depends on insect pollinators
   B. The flower opens only during pollination
   C. The flower never opens and self-pollinates
   D. The stigma remains closed after anther maturation

	3. Which of the following pairs is correctly matched? A. Herkogamy – Self-pollination B. Chasmogamy – Closed flower C. Dichogamy – Temporal separation of sex organs maturity period D. Xenogamy – Genetically identical pollen transfer	
	4. Internal Choice (Attempt 4A or 4B): **4A.** Which of the following ensures **xenogamy** but not **geitonogamy**? A. Monoecious condition B. Presence of pollinators C. Dioecious condition D. Bisexual flowers on same plant **OR** **4B.** Geitonogamy is functionally: A. Cross-pollination but genetically self-pollination B. Self-pollination but genetically cross-pollination C. Self-pollination in cleistogamous flowers D. Cross-pollination with genetic variation	
30	A patient reported to a radiologist with pain in pelvic region. After medical diagnosis procedure it was confirmed that the patient had developed localized neoplastic cell mass deep in to the medulla in kidney. The Doctor advised for the solution depicted in the figure given below. Study the figure and answer the following Question associated with this case:  1. What is/are the confirmatory diagnisis method(s) to declare neoplsty? A. X- Ray B. CT-Scane C. MRI D. Biopsy 2. Which combination of post-surgical medication shall not be prescribed by the Doctor? A. Cannabinoid and Opioid B. Cyclosporin-A and Opioid C. Cyclosporin –A and alfa-interferon D. Alfa-interferon and Opioid 3. Which property/properties differentiate the neoplastic cell from other body cells is/are: A. Controlled cell division and cell heap development. B. Loss of cell-cell junction and less cell division C. Repeated cell division and invasion to other body parts D. Invasion to other body parts and controlled cell division **4. : Internal choice, attempt 4A or 4B.** 4A. It was noted that the patient was following very good and healthy life style. Which of the following may be the possible reason of neoplastic cell in the above patient? A. Cellular gene	4

B. Viral gene
C. Exposure to radiation heavy metals
D. All of the above

OR

4B. In case if the pepsin synthesizing cell were identified in kidney, which organ is likely to be at risk and at what stage?

A. Liver and Benign stage
B. Stomach and Benign stage
C. Stomach and metastasis stage
D. Pancreas and Metastasis stage

Section-E

31 2.5+2.5

A. Explain how Lac operon is expressed in *E. coli* when optimum quantity of lactose is added in culture medium under following headings:
   1. Who is playing role as an inducer in this operon?
   2. What is the product of 'z-gene' and its effect on lactose
   3. What will happen if excess quantity of lactose is added in medium
   4. How many types of DNA dependent RNA polymerase work in*E. coli*?

B. Darwin finch in Galapagos Island was isa classic example of adaptive radiation. Explain the following in light of evolution:
   1. Bat, insects and birds wings are example of convergent evolution. Why?
   2. Homology represents commonness in ancestry? How?
   3. Draw the relationship between thrones of cactus and bougainvillea.

OR

A. Explain the semiconservative DNA duplication under the following points:
   1. What is meant by "semiconservative" replication of DNA?
   2. What will be the percentage of bacteria containing light chain of DNA after 3 generation of culture in Meselson-Stahl experiment?
   3. Which type bands will be formed in CsCl based density gradient centrifuge tube after four generation of culture?

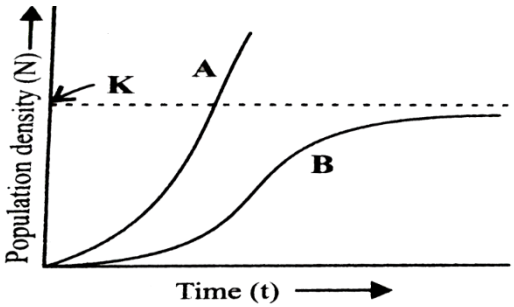
B. Answer the following questions related to human evolution:

   1. Name the fossil that is considered as the connecting link between apes and humans.
   2. Mention any two characteristic features of *Homo erectus*.
   3. Arrange the following human ancestors in chronological order (from oldest to most recent):
   Homo habilis, *Homo sapiens*, *Australopithecus, Homo erectus*.

32 2.5+2.5

A. Study the population date given in the following table and answer the questions.

	Beetle		Mouse	
	Births/100 individuals/year	Deaths/100 individuals/year	Births/100 individuals/year	Deaths/100 individuals/year
No --→	60	20	80	70

	1. Calculate the r (intrinsic rate of natural increase) for both beetle and mouse population. 2. What will be the population size of mouse if 5 Immigration happened seen in one year? 3. What does a negative or zero r value indicate about a population? B. Answer the followings briefly 1. List the ***"The Evil Quarte"*** 2. What are the two major basis of declaration of any natural habitat as biodiversity hotspot for the purpose of in-situ conservation? 3. "Biodiversity knows no political boundaries and its conservation is therefore a collective responsibility of all nations" give one example to justify the statement. **OR** A. Study the given graph to represent two population growth models and answer eh questions  1. Name the growth model curve represented by curve A. 2. What "K" represent for? Write down equation of population density for the curve B. 3. Which kind of growth pattern is followed by current human population and why? B. Answer the following 4. Explain the role of predators as "Conduits of energy"and controller of population density of prey population in an ecosystem. 5. How resource partitioning promotes co-existence to avoid Competitive exclusion? Give one example. 6. During the course of evolution, the eggs of the parasitic bird have evolved to resemble the host's egg in size and color to reduce the chances of the hostbird detecting the foreign eggs and ejecting them from the nest. Name the interaction.	
33	A. Answer the following questions: 1. Differentiate between pro-insulin and mature insulin. 2. Which Vector may be used to deliver insulin gene in suitable host (bacteria) for getting the desired product? 3. What are the down streaming processes involved in production of insulin using biotechnology? B. Answer the following questions: 1. What is Enzyme replacement therapy? Give one example. 2. What are wide applications of the transgenic animal in medical science? **OR** A. How a gene of interest can be cloned ex-situ? Mention the raw material and steps of the process. B. Explain the process of tissue culture under the following heading: 1. Micro-propagation 2. Somatic Hybridization	