

ST. MARGARET SR. SEC. SCHOOL
MID TERM EXAMINATION 2024-25
BIOLOGY (044)
CLASS XII
Sample paper

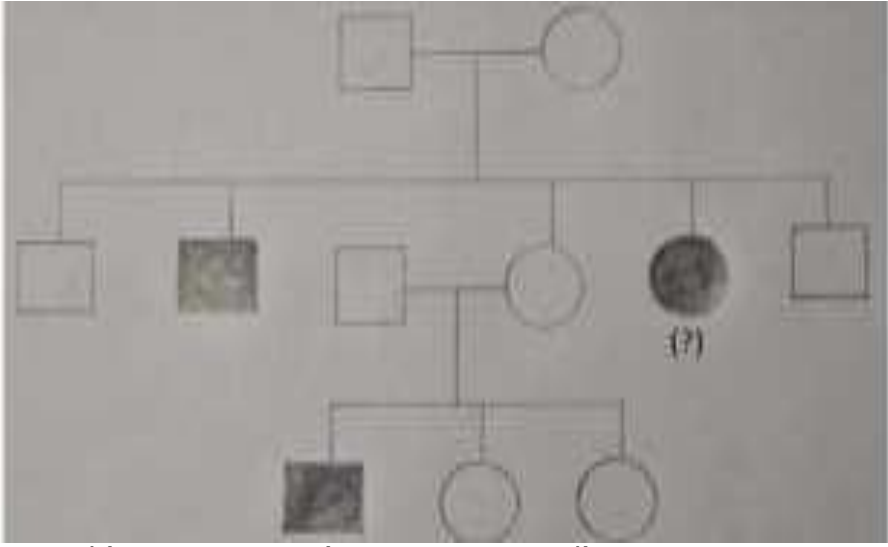
Allowed Time: 3Hr

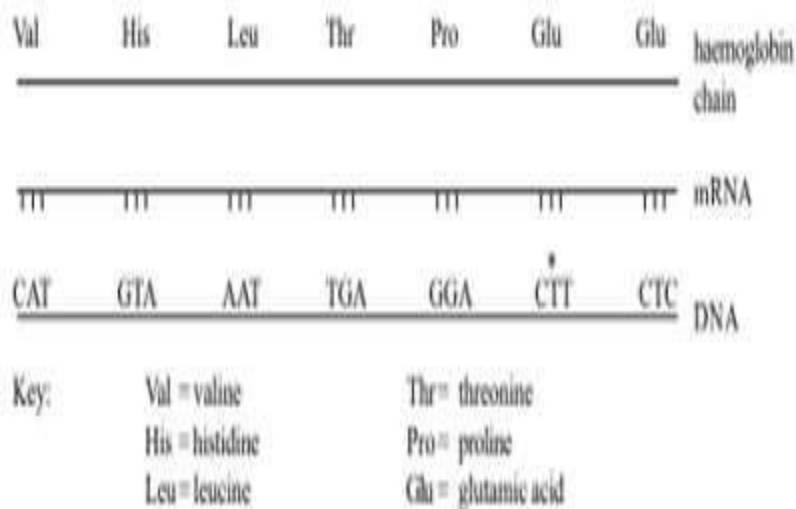
Max.Marks: 70

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.

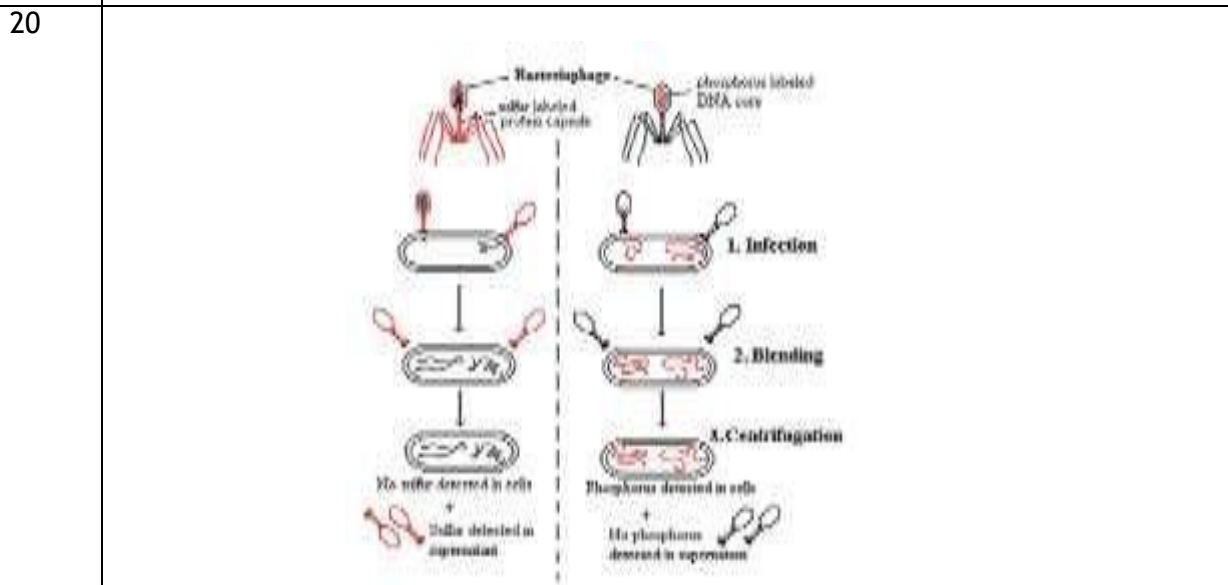
Q.No.	Question	Marks
1	Haplodiploidy is found in (a) grasshoppers and cockroaches (b) birds and reptiles (c) butterflies and moths (d) honeybees, ants and waspe.	1
2	$(p + q)^2 = p^2 + 2pq + q^2 = 1$ represents an equation used in (a) Population genetics (b) Mendelian genetics (c) Biometrics (d) Molecular genetics	1
3	During microsporogenesis, meiosis occurs in (a) Endothecium (b) Microspore mother cells (c) Microspore tetrads (d) Pollen grains	1
4	The net electric charge on DNA and histones is (a) Both positive (b) Both negative (c) Negative and positive, respectively (d) Zero	1
5	The promoter site and the terminator site for transcription are located at (a) 3' (downstream) end and 5' (upstream) end, respectively of the transcription unit (b) 5' (upstream) end and 3' (downstream) end, respectively of the transcription unit (c) The 5' (upstream) end (d) The 3' (downstream) end	1
6	How many meiotic divisions are required for the formation of 100 pollen grains? (a) 100(b) 50(c) 25 (d) 26	1
7	If mammalian ovum fails to get fertilised, which one of the following is unlikely? (a) Corpus luteum will disintegrate. (b) Progesterone secretion rapidly declines. (c) Estrogen secretion increases. (d) Primary follicle starts developing.	1

8	<p>What should be the genotype of the indicated member?</p>  <p>a) AA b) Aa c) XY d) aa</p>	1
9	<p>Appearance of antibiotic-resistant bacteria is an example of</p> <p>(a) adaptive radiation (b) transduction (c) pre-existing variation in the population (d) Divergent evolution.</p>	1
10	<p>Mature Graafian follicle is generally present in the ovary of a healthy human female around</p> <p>(a) 5-8 day of menstrual cycle (b) 11-17 day of menstrual cycle (c) 18-23 day of menstrual cycle . (d) 24-28 day of menstrual cycle</p>	1
11	<p>A national level approach to build up a reproductively healthy society was taken up in our country in</p> <p>(a) 1950s (b) 1960s (c) 1980s (d) 1990s</p>	1
12	<p>Who amongst the following scientists had no contribution in the development of the double helix model for the structure of DNA?</p> <p>(a) Rosalind Franklin (b) Maurice Wilkins (c) Erwin Chargaff (d) Meselson and Stahl</p>	1
	<p>Question No. 13 to 16 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:</p> <p>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.</p>	
13	<p>Assertion: Primary endosperm nucleus is diploid. Reason: It is the product of double fertilisation.</p>	1
14	<p>Assertion: Ribosomal RNA is synthesized in the nucleus of the cell. Reason: It is translated with the enzyme RNA polymerase III.</p>	1
15	<p>Assertion: Fimbriae are finger-like projections of the infundibulum part of oviduct which is closest to ovary. Reason: They are important for collection of ovum after ovulation from ovary.</p>	1
16	<p>Assertion: In dog flowers F1 plants produce pink flowers. Reason: It is due to codominance of flower colour alleles with both genes expressing themselves equally.</p>	1
Section – B		
17	<p>Explain the process of hormonal regulation of oogenesis.</p>	2
18	<p>The diagram below shows the sequence of amino acids in part of a haemoglobin molecule.</p>	2



- a) If the base T* was substituted with A, how would it affect the haemoglobin chain?
- b) Name the condition and the effects associated with the above substitution.

19 How do homologous organs represent divergent evolution? Explain with the help of a suitable example. **2**



- a) Who performed this experiment?
- b) What was proved by this experiment?

21 Draw a flow chart to trace the path of sperm transport from seminiferous tubules to urethra. **2**

OR

List two strategies that a bisexual chasmogamous flower can evolve to prevent self-pollination

Section – C

22 a) This picture shows Adaptive radiation of marsupials of Australia. What does it mean? **3**

b) Cite any other example of adaptive radiation.



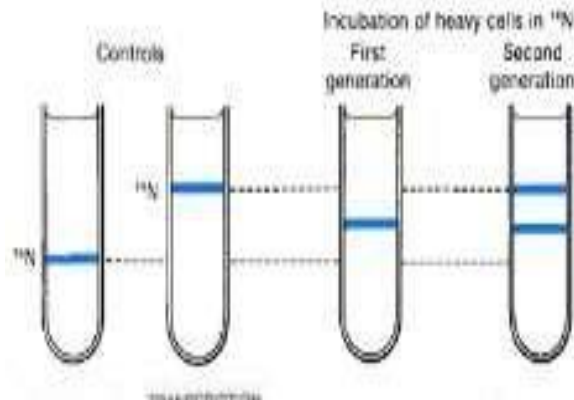
23	Explain the phases in embryonic development from the morula stage till the establishment of pregnancy in a human female.	3
24	(a) What are the probable factors that contributed to population explosion in India? (b) The procedure of GIFT involves the transfer of female gamete to the fallopian tube. Can gametes be transferred to the uterus to achieve the same result? Explain.	3
25	a) Draw the graphs showing different types of Natural Selection. b) What names are given to the types of selection and why? c)	3
26	State and explain any three factors affecting allele frequency in populations.	3
27	Draw the diagram of a microsporangium and label its wall layers. Write briefly on the role of the endothecium.	3
28	Define aneuploidy. How is it different from polyploidy? Describe the individuals having the following chromosomal abnormalities. a.) Trisomy of 21st chromosome b.) XXY c.) XO	3

SECTION D

Q. No. 29 and 30 are case-based questions. Each question has 3 subparts with internal choice in one subpart.

29

4



a) What was the objective of this experiment?

OR

- a) Who performed it?
- b) How was the DNA separated into different layers?
- c) Name any other scientist who had performed experiment to prove the same.

30

4

		Second base				
		U	C	A	G	
First base	U	UUU } Phenylalanine UUC } UUA } Leucine UUG }	UCU } UCC } Serine UCA } UCG }	UAU } Tyrosine UAC } UAA } Stop codon UAG } Stop codon	UGU } Cysteine UUC } UGA } Stop codon UGG } Tryptophan	Third base U C A G U C A G U C A G
	C	CUU } Leucine CUC } CUA } CUG }	CCU } CCC } Proline CCA } CCG }	CAU } Histidine CAC } CAA } Glutamine CAG }	CGU } CCG } Arginine CGA } CGG }	
	A	AUU } Isoleucine AUC } AUA } AUG } Methionine start codon	ACU } ACC } Threonine ACA } ACG }	AUU } Asparagine AUC } AAA } Lysine AAG }	AUU } Serine AUC } AGA } Arginine AGG }	
	G	GUU } Valine GUC } GUA } GUG }	GCU } Alanine GCC } GCA } GCG }	GAU } Aspartic acid GAC } GAA } Glutamic acid GAG }	GUU } Glycine GUC } GGA } GGG }	

- a) Mention the 'Nonsense codons'.
- b) If any mRNA is as written as below then how many Amino acid will the polypeptide contain?
5' AUGCAGGGUUCAAAUAGGAUUCGGACUA 3'
- c) Genetic code is degenerate. Take help of this table to explain it.

OR

- c) Which codon initiates translation? Does it have any other function?

SECTION E

31

Placed below are case studies of some couples who were not able to have kids. These couples are not ready for adoption or taking gametes from donors. After thoroughly examining the cases, which Assisted Reproductive Technology will you suggest to these couples as a medical expert? Explain briefly with justification of each case.

5

Couple	Test reports of Female partner	Test reports of male partner
Couple 1	Normal reports	Normal sperms in testes, Missing connection in epididymis and Vas deferens
Couple 2	Blockage in the fallopian tube	Normal reports
Couple 3	Normal reports	Poor semen parameters in terms of count, motility and morphology
Couple 4	low ovarian reserve	Normal reports
Couple 5	Sterilization in male	Morphologically abnormal sperms

OR

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 for -	Name of contraceptive device	Mode of action
1	blocking the entry of sperms through cervix		
2	spacing between children		
3	effective emergency contraceptive		
4	terminal method to prevent any more pregnancy in female		
5	sterilization in male		

32	<p>a) Why is it not possible for an alien DNA to become part of chromosome anywhere along its length and replicate normally?</p> <p>b) Name the enzyme involved in continuous replication of DNA strand. Mention the polarity of the template strand</p> <p>c) If the base adenine constitutes 31% of an isolated DNA fragment, then what is the expected percentage of the base cytosine in it?</p> <p>d) Explain the two factors responsible for conferring stability to double helix structure of DNA</p> <p>e) Why is DNA replication continuous and discontinuous in a replication fork?</p> <p style="text-align: center;">OR</p> <p>In shorthorn cattle, the coat colours red or white are controlled by a single pair of alleles. A calf which receives the allele for red coat from its mother and the allele for white coat from its father is called a 'roan'. It has an equal number of red and white hairs in its coat.</p> <p>a) Is this an example of codominance or of incomplete dominance?</p> <p>b) Give a reason for your answer.</p> <p>c) With the help of genetic cross explain what will be the consequent phenotype of the calf when</p> <p>i. red is dominant over white</p> <p>ii. red is incompletely dominant.</p>	5
33	<p>a) Corpus luteum in pregnancy has a long life. However, if fertilisation does not take place, it remains active only for 10-12 days. Explain.</p> <p>b) What is foetal ejection reflex? Explain how it leads to parturition.</p> <p>c) Give a schematic labelled diagram to represent oogenesis (without descriptions).</p> <p style="text-align: center;">OR</p> <p>a) Which is the triploid tissue in a fertilised ovule? How is the triploid condition achieved?</p> <p>b) Are pollination and fertilization necessary in apomixis? Give reasons.</p> <p>c) Starting with the zygote, draw the diagrams of the different stages of embryo development in a dicot. 5</p>	5
