



INDIAN SCHOOL AL WADI AL KABIR

FIRST ASSESSMENT (2023 - 24)

Class: XII

Sub: BIOLOGY (044)

Max Marks: 70

Date: 01.10.2023

Set - 1

Time : 3 hours


General Instructions:



















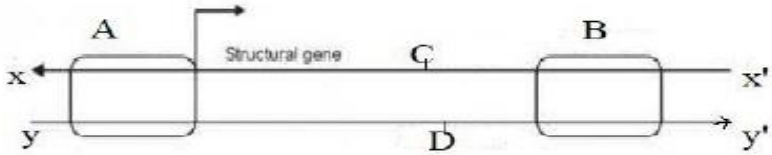
- (i) All questions are compulsory.
- (ii) The question paper has five sections and 33 questions. All questions are compulsory.
- (iii) **Section–A** has 16 questions of 1 mark each; **Section–B** has 5 questions of 2 marks each; **Section– C** has 7 questions of 3 marks each; **Section– D** has 2 case-based 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																						
Sl. No.	QUESTION	MARKS																				
1	<p>A short piece of DNA, having 20 base pairs, was analyzed to find the number of nucleotide bases in each of the polynucleotide strands. Some of the results are as follows.</p> <table border="1"><thead><tr><th colspan="5">Number of nucleotide bases</th></tr><tr><th></th><th>Adenine</th><th>Cytosine</th><th>Guanine</th><th>Thymine</th></tr></thead><tbody><tr><th>Strand 1</th><td>4</td><td>4</td><td></td><td></td></tr><tr><th>Strand 2</th><td></td><td>5</td><td></td><td></td></tr></tbody></table> <p>How many nucleotides containing Adenine were present in strand 2?</p> <p>a) 2 b) 4 c) 5 d) 7</p>	Number of nucleotide bases						Adenine	Cytosine	Guanine	Thymine	Strand 1	4	4			Strand 2		5			1
Number of nucleotide bases																						
	Adenine	Cytosine	Guanine	Thymine																		
Strand 1	4	4																				
Strand 2		5																				
2	<p>The following is not an example of IUDs</p> <p>a) Lippe's Loop b) Diaphragms c) LNG-20 d) Progestasert</p>	1																				

3	<p>The bones of forelimbs of whale, bat, cheetah and man are similar in structure, because</p> <p>a) one organism has given rise to another b) they share a common ancestor c) they perform the same function. d) they have biochemical similarities.</p>	1
4	<p>Generative nucleus divides forming</p> <p>a) 2 male nuclei b) 3 male nuclei c) female nuclei d) female nuclei</p>	1
5	<p>Which of the following are the two key concepts of Darwinian theory of evolution?</p> <p>a) Genetic drift and mutation b) Adaptive radiation and homology c) Mutation and natural selection d) Branching descent and natural selection</p>	1
6	<p>If a genetic disease is transferred from a phenotypically normal but carrier female to only some of the male progeny, the disease is</p> <p>a) autosomal dominant b) autosomal recessive c) sex-linked dominant d) sex-linked recessive.</p>	1
7	<p>The process of formation of seeds without fertilization in flowering plants is known as</p> <p>a) Budding b) Apomixis c) Sporulation d) Somatic hybridization</p>	1
8	<p>Which of the following will not result in variations among siblings?</p> <p>a) Independent assortment of genes b) Crossing over c) Linkage d) Mutation</p>	1

9	At a particular locus, the frequency of allele A is 0.8 and that of allele a is 0.2. What would be the frequency of heterozygotes in a random mating population at equilibrium? a) 0.32 b) 0.16 c) 0.24 d) 0.48	1
10	The hormone that is released from the ovary is _____. a) Progesterone b) Vasopressin c) Testosterone d) None of the above	1
11	After ovulation Graafian follicle regresses into a) corpus atresia b) corpus callosum c) corpus luteum d) corpus albicans	1
12	The wall of the ovary develops into the wall of the fruit called a) Perisperm b) Pericarp c) Mesocarp d) Epiblast	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: Smoking can raise blood pressure and increase heart rate. Reason: Nicotine stimulates adrenal glands to release adrenaline and nor-adrenaline into the blood circulation, both of which raise blood pressure and increase heart rate.	
14	Assertion: In <i>Mirabilis</i> , selfing of F1 pink flower plants produces same phenotypic & genotypic ratio. Reason: Flower colour gene shows incomplete dominance.	1
15	Assertion: Genes are stretches of DNA that make up the different codes for the different proteins.	1

	Reason: DNA is the complex bio molecule made up of sugars, phosphorus and nitrogen bases.	
16	Assertion: Organic compounds first evolved in earth required for origin of life were protein and nucleic acid. Reason: All life forms were in water environment only	1
SECTION B		
17	The figure given below shows the heart shaped embryo in a dicot plant, Draw neat labelled diagrams showing the stage before and after this stage.  <p style="text-align: center;">OR</p> <p>Draw a neat and labelled diagram showing the structure of the maize seed.</p>	2
18	Complete the illustration chart given below (a, b, c &d) <pre> graph TD Drugs --> a((a)) Drugs --> Cannabinoid Drugs --> Cocaalkaloid a --> CNS[Central Nervous system and Gastro intestinal tract] CNS --> c((c)) Cannabinoid --> Receptors[Cannabinoid receptors in brain] Receptors --> d((d)) Cocaalkaloid --> b((b)) b --> Erythroxylum[Erythroxylum coca] </pre>	2
19	a) From the information given below, identify the type of mutation shown by the β Hb with reason. b) Relate the mutation to sickle cell anaemia and explain how it affects the shape of the RBC.	2

	<p>NORMAL β-GLOBIN</p> <p>DNA.....TGA GGA CTC CTC.....</p> <p>mRNA.....ACU CCU GAG GAG.....</p> <p>Amino acid.....thr pro glu glu.....</p> <p>MUTANT β-GLOBIN</p> <p>DNA.....TGA GGA CAC CTC.....</p> <p>mRNA.....ACU CCU GUG CTC.....</p> <p>Amino acid.....thr pro val glu.....</p>									
20	<p>Explain the evolution that the marsupial mole and marsupial mouse have shown over a long period of time and also relate it to the evolution shown between them and placental mammals.</p> <table border="1" style="width: 100%; text-align: center;"> <tbody> <tr> <td style="writing-mode: vertical-rl; transform: rotate(180deg);">Australian marsupials</td> <td> Mole</td> <td> Anteater</td> <td> Mouse</td> </tr> <tr> <td style="writing-mode: vertical-rl; transform: rotate(180deg);">Placental mammals</td> <td> Marsupial mole</td> <td> Numbat (anteater)</td> <td> Marsupial mouse</td> </tr> </tbody> </table>	Australian marsupials	 Mole	 Anteater	 Mouse	Placental mammals	 Marsupial mole	 Numbat (anteater)	 Marsupial mouse	2
Australian marsupials	 Mole	 Anteater	 Mouse							
Placental mammals	 Marsupial mole	 Numbat (anteater)	 Marsupial mouse							
21	<p>a) What is aminoacylation of tRNA</p> <p>b) What is a codon</p>	2								
SECTION C										
22	 <p>a) Identify the polarity of x to x' and y to y' in the diagram below.</p> <p>b) What is the significance of A and B in transcription.</p> <p>c) If the sequence of D is y- ATGCATGCATGCATGCATGC-y'. Write down the sequence of complementary strand and the sequence of mRNA transcribed.</p>	3								
23	<p>Give a diagrammatic representation of Millers experiment.</p> <p style="text-align: center;">OR</p> <p>In the form of a flow chart illustrate a brief account of human evolution.</p>	3								
24	<p>How is the placenta formed, apart from the other functions it carries out, it also acts as an endocrine tissue and provides passive immunity, briefly explain these additional functions.</p>	3								
25	<p>With the help of a flow chart represent the replication of the retrovirus in the human body.</p> <p style="text-align: center;">OR</p> <p>With the help of a flow chart represent the life cycle of the Plasmodium.</p>	3								

26	Describe Frederick Griffith experiment of Transforming Principle, how was the biochemical characterization of this principle proved.	3
27	a) State any four functions of the immune system. b) How are primary lymphoid organs different from secondary lymphoid organs.	3
28	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.	3

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

SECTION D

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

29	<p>The graphs below show three types of natural selection. The shaded areas marked with arrows show the individuals in the population which are not selected. The dotted vertical lines show the statistical means.</p> <p>a) What names are given to the types of selection shown in graphs A and C.</p> <p>b) Which type of selection is industrial melanism observed in moth, <i>Biston betularia</i>?</p> <p>i) Stabilizing ii) Directional iii) Disruptive iv) Artificial</p> <p>c) After the selection has operated for several generations in the above populations indicated as Graph A and C, graphically illustrate the probable results.</p>	<p>1</p> <p>1</p> <p>2</p>
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	OR	
	c) How does genetic drift bring about founders' effect?	
30	<p>Ascaris, the common round worm and Wuchereria, the filarial worm, are some of the 4 helminths which are known to be pathogenic to man. Ascaris, an intestinal parasite causes ascariasis. Symptoms of this disease include internal bleeding, muscular pain, fever, anaemia and blockage of the intestinal passage. Given below is a graph of <i>Ascaris lumbricoides</i> Infection in the Mbeya Region of Tanzania.</p> <p>a) From the above graph state the age of maximum infection intensity in Mbeya region of Tanzania.</p> <p>b) How does a person acquire ascariasis?</p> <p>c) Name a helminth pathogen which gets transmitted to a healthy person through the bite of a female mosquito vector. Mention its two diagnostic symptoms</p> <p style="text-align: center;">OR</p> <p>c) Name the causative organism of the disease amoebiasis. What are mechanical carriers, Identify the mechanical carrier of amoebiasis.</p>	<p>1</p> <p>1</p> <p>2</p>
	SECTION E	
31	<p>In operon the genes encode proteins that allow the bacteria to use lactose as a source of energy.</p> <p>Explain the regulation of Lac Operon.</p> <p style="text-align: center;">OR</p>	5



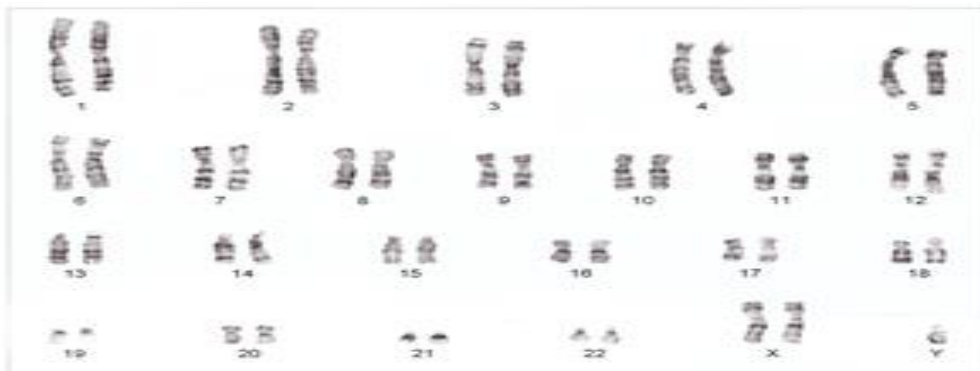
The DNA samples of two suspects were taken to solve a crime scene as shown.

- Which process was used to get these DNA bands, State its principle.
- Identify the criminal out of the two suspects.
- Who developed this technique, which DNA did he use and why?
- One of the steps in this method is Gel electrophoresis, why is this step done, which step follows it

32

This is the picture showing the karyotype of an individual with chromosomal disorder.

5



- Identify the disorder with a reason.
- Give any two abnormalities shown by the affected individual.
- A single gene may produce more than one effect of dominance and hence not an autonomous feature of a gene. Explain this statement with an example.

OR

	<p>The following pedigree chart shows the inheritance of hemophilia in a family.</p> <p>a) What would be the possible genotype of members 2 and 5? b) A blood test shows that member 14 has hemophilia gene. What would be the probability that her child will be a hemophilic boy or a hemophilic girl c) Explain Linkage and Recombination and its significance in genetics.</p>	
33	<p>a) Identify any four outbreeding devices that the flowering plants have adopted to prevent self-pollination b) Describe water as a pollinating agent with examples.</p> <p style="text-align: center;">OR</p> <p>a) What is foetal ejection reflex. b) With the help of a schematic representation explain the process of spermatogenesis in human males.</p>	5

ANSWER KEY

SECTION A		
1	d) 7	1
2	a) suppression of gonadotropins	1
3	b) they share a common ancestor	1
4	a) 2 male nuclei	1
5	d) sex-linked recessive.	1
6	d) Branching descent and natural selection	1

7	b) Apomixis	1
8	c) Linkage	1
9	a) 0.32	1
10	c) Testosterone	1
11	c) corpus luteum	1
12	b) Pericarp	1
13	a	
14	a	1
15	b.	1
16	b	1
SECTION B		
17	Globular Mature Or neat diagram with 4 labeling	1 1 0.5X4
18	a-opioids + b- CNS + c-Papaver somniferum + d- Cannabis sativa	0,5X4
19	a) Point mutation+ mutations due to change in single base pair of DNA . b) RBC-sickle shape as the mutant Hb molecule undergoes polymerisation under low oxygen tension/pressure	1 1
20	evolution of marsupial mole and marsupial mouse- convergent due to repeated adaptive radiation, evolution shown between them and placental mammals- divergent because they share a common ancestor.	1 1
21	a) negatively charged -DNA and positively charged -Histones. b) cistron-A segment of DNA coding for a polypeptide.	1 1
SECTION C		
22	a) polarity of x to x'-3'-----5' and y to y'5'-----3' b) A -promoter and B -terminator c) y- ATGCATGCATGCATGCATGC-y'. TACG TACGTACGTACGTACGTACG-complementary strand sequence of mRNA transcribed- AUGCAUGCAUGCAUGCAUGCAUGC	0.5 1 1.5
23	Diagram on pg 128 fig 7.1(diagram+ labelling) Or Human evolution - names and one special feature.	1+2 0.5X6
24	the chorionic villi and the uterine tissue get interdigitated to for the placenta, endocrine tissue- hormone-hCG, hPL, estrogen ang progestogens (any 3) passive immunity- IgA antibodies pass through it to give immunity to the growing fetus.	1 1.5 0.5
25	flow chart represent the replication of the retrovirus Or With the help of a flow chart represent the life cycle of the Plasmodium.	3

26	Procedure + observation & conclusion	2+1
27	a) any four functions of the immune system. b) any 1 difference	2 1
28	Couple1-IVF, followed by ZIFT/test tube baby. Couple2-IVF followed by IUT Couple3-ICSI-artificial insemination	3
SECTION D		
	Q.no 29 and 30 are case based questions. Each question has subparts with internal choice in one subpart	4
29	a) A-Stabilizing and C-Disruptive b) ii c) graphically illustrate the probable results. <p style="text-align: center;">Or</p> genetic drift-gene flow by chance sometimes the change in the allelic frequency is very different in the new sample of population and they become different species. Original drifted population becomes founders	1 1 1+1 0.5 1 0.5
30	a) 8-10 yrs b) The eggs of the parasite are excreted along with the faeces of infected persons which contaminate soil, water, plants, fruits, etc. c) Filariasis/elephantiasis+ symptoms-inflammation of the lymphatic vessels of the limbs especially the lower limbs/genital organs <p style="text-align: center;">Or</p> c)Entamoeba histolytica+ They carry the parasite externally (not inside their body) from the faeces of infected person to the food+ Houseflies	1 1 2 2
SECTION E		
31	Diagrammatic representation of the operon Explanation <p style="text-align: center;">Or</p> a) DNA fingerprinting+ principle. b) Suspect-2 c) Alec Jeffery's+ Satellite DNA+ VNTR with high degree of polymorphism. d) To separate DNA strands + Southern blotting	2 3 1.5 0.5 2 1
32	a) Klinefelter's syndrome +trisomy of the sex chromosome b) any two abnormalities	2 1 2

	<p>c) Size of starch grain -Bb-intermediate starch grain-codominance+ shape of the seeds Bb-Round-complete dominance</p> <p style="text-align: center;">Or</p> <p>a) genotype of 2 -X^hX & 5--X^hY</p> <p>b) hemophilic boy-50% or a hemophilic girl-nil unless she marries a hemophilic man</p> <p>c) Explanation + significance</p>	<p>1</p> <p>1</p> <p>3</p>
33	<p>a) any four outbreeding devices</p> <p>b) water as a pollinating agent with examples.</p> <p style="text-align: center;">Or</p> <p>a) foetal ejection reflex.</p> <p>b) spermatogenesis in human males.</p>	<p>2</p> <p>3</p> <p>2</p> <p>3</p>