KVS RO LUCKNOW

Pre-Board Exam (2022-23)

Sub-Biology (044)

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

General Instructions:

I. **All questions are compulsory**

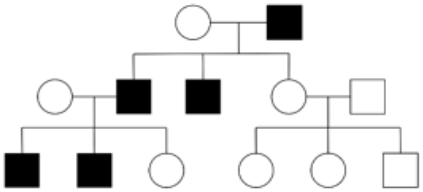
II. **The Question Paper has five sections and 33 questions. All questions are compulsory.**

III. **Section –A has 16 questions of 1 mark each. Section B has 5 questions of two 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.**

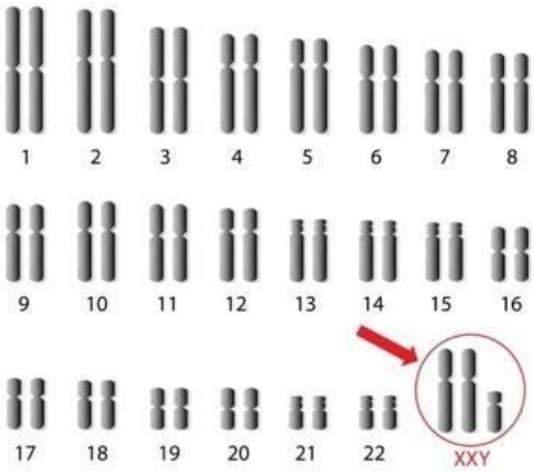
IV. **There is no overall choice. However internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.**

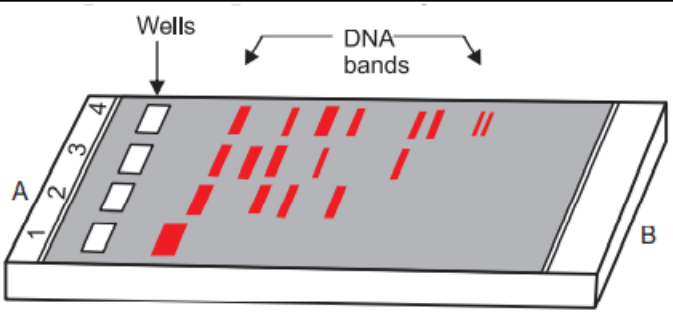
V. **Wherever necessary, a neat and properly labeled diagram should be drawn.**

Section A		
Q.No	Questions	Marks
1	How many pollen grains are formed from 5 microspore mother cells, when they undergo meiosis? a. 40 b. 10 c. 20 d. 30	1
2	Scientist while working with sea urchins, extracted their DNA, which is double-stranded showing 17% of the bases to be cytosine. Now, the percentage of the other three bases in this DNA are: a. G–34%, A–24.5%, T–24.5% b. G–17%, A–16.5%, T–32% c. G–17%, A–33%, T–33% d. G–8.5%, A–50%, T–24.5%	1
3	Diaphragms are contraceptive devices used by females. Read the statements given below with respect to diaphragms and choose the correct statements. I. They act as physical barriers to sperm entry. II. They even prevent the spread of STIs. III. They are placed to cover the cervical region. IV. They act as spermicidal agents. V. Their use is associated with an increased urinary tract infection. a. I, II, III and IV b. II, III, IV and V c. II, IV and V d. I, III and V	1
4	Fill in the missing blank „a“ and „b“ exhibiting the route of sperm transport. Seminiferous tubule□----^{i}------□Vasa Efferentia □Epididymis -----^{ii}---□Urethra a) i-Vas deferens ii- Rete testis b) i- Rete testis ii- Vas deferens c) i- Lobules ii- urinary bladder	1

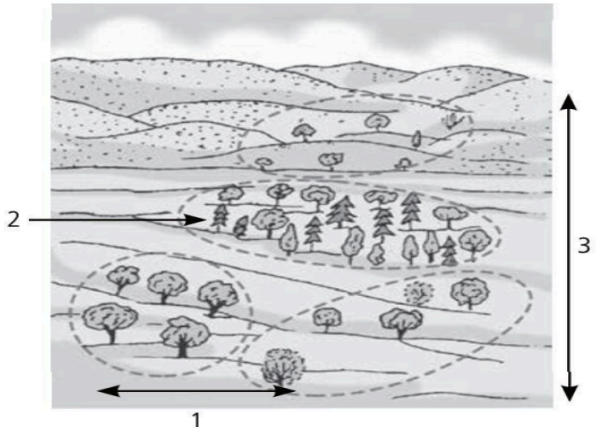
	d) i- Vas deferens ii- Lobules	
5	A sedentary sea anemone gets attached to the shell lining of a hermit crab. The association is a) commensalism b) amensalism c) ectoparasitism d) symbiosis	1
6	ADA is an enzyme that is deficient in a genetic disorder SCID. What is the full form of ADA? a) Adenosine deoxygenase b) Adenosine deaminase c) Aspartate deaminase d) Arginine deaminase	1
7	LSD is obtained from a) *Erythroxylum coca* b) *Cannabis sativa* c) *Claviceps purpurea* d) *Papaver somniferum*	1
8	Identify the type of inheritance from the following pedigree:  a) X linked recessive inheritance b) Y linked Inheritance c) Autosomal Dominant inheritance d) None of the above	1
9	A common biocontrol agent for the control of plant diseases is: a) Baculovirus b) Bacillus thuringiensis c) Glomus d) Trichoderma	1
10	The second trophic level in a lake is a) Phytoplankton b) Zooplankton c) Benthos d) Fishes	1
11	Antibody abundant in Colostrum is: a) IgA b) IgG c) IgD d) IgM	1

12	The given Karyotype below shows the following syndrome:	1

	 a) Turner‟s Syndrome b) Down‟s Syndrome c) Klienfelter‟s Syndrome d) Criminal Syndrome	
Question No 13 to 16 consist of two statements- Assertion (A) and Reason (R). Answer these questions by selecting the appropriate option given below: 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 the reason is false. d. Assertion is False but Reason is true		
13	**Assertion:** In a monohybrid cross, only dominant characters exhibit themselves in the F1 generation **Reason:** Dominant trait is expressed only in the heterozygous condition	1
14	**Assertion:** Agrobacterium is used to deliver foreign gene in animals. **Reason:** Agrobacterium has Ti plasmid.	1
15	**Assertion:** In birds, sex is determined by the male bird. **Reason**: Female bird produces two types of genetically different egg containing either Z or W sex chromosome.	1
16	**Assertion:** Predators are organisms that feed on other individuals. **Reason:** Prey species have evolved various defenses to lessen the impact of predation.	`1
Section B		
17	Rajesh was doing gel electrophoresis to purify DNA fragments. Given below is the sketch of the observations of the experiment performed by him	2

	 (i) At which end he would have loaded the samples and where? (ii) Analyse the reason for different positions taken up by the DNA bands.	
18	Name the special enzyme which is obtained from bacteria *Thermus aquaticus* and used in PCR. Also write its significance.	2
19	While playing in the ground one of your friends is bitten by a snake. He is taken to a nearby hospital where he is administered an injection to counter snake venom. Name the type of immunization in the above case and explain the benefit of this type of immunization in above case.	2
20	How does a small amount of curd added to fresh milk convert it into curd? Mention any one advantage of curd over milk.	2
21	Name two hormones that can be found only in the blood of a pregnant woman. Mention the source organ/tissue that secretes each of them. Or A non-biology person is quite shocked to know that the apple is a false fruit, the mango is a true fruit. As a biology student, how would you satisfy this person?	2
	Section C	
22	Darwin found the varieties of finches that traveled to the Galapagos Islands and observed variations in them.  (i) What role does an individual organism play as per Darwin's theory of natural selection? (ii) How did Darwin explain the existence of different varieties of finches on Galapagos Islands?	3

	(iii) What is “fitness of an individual” according to Darwin?	

23	(a) Name any 2 types copper releasing IUDs. (b) List the advantages of using 'Saheli' as a contraceptive.	3
24	Draw a schematic sketch of pBR322 plasmid and label the following in it: (a) Any two restriction sites. (b) ori and rop genes. (c) An antibiotic resistant gene	3
25	How does β-galactosidase coding sequence act as a selectable marker? Explain. Why is it a preferred selectable marker to antibiotic resistance genes?	3
26	a) Explain Hardy Weinberg Principle. b) The frequency of two alleles in a gene pool is 0.19 (A) and 0.81(a). Assume that the population is in Hardy-Weinberg equilibrium. Calculate the percentage of heterozygous individuals in the population.	3
27	(a) How does cleistogamy ensure autogamy? (b) State one advantage and one disadvantage of cleistogamy to the plant.	3
28	Alien species are highly invasive and are a threat to indigenous species. Substantiate this statement with any three examples. Or Predation is usually referred to as a detrimental association. State any three positive roles that a predator plays in an ecosystem.	3
Section D **Q.no 29 and 30 are case-based questions. Each question has subparts with internal choice in one subpart.**		
29	Read the following and answer any four questions: Ecosystem diversity is the variety of forms in the ecosystem due to diversity of niches, trophic levels and ecological processes like nutrient recycling, food webs, energy flow, etc. study the given figure:  a) Identify different types of diversity denoted by 1,2 and 3 in the given figure. b) Alpha diversity is the diversity present: a. Within community b. Between communities c. In ranges of communities d. None of these c) Diversity of organisms sharing the same habitat or community is termed as: a. Alpha diversity	4

	b. Beta diversity c. Gamma diversity d. Delta diversity. d) Concept of three types of ecological diversity was given by: a. Elton b. Odum c. Edward Wilson d. Whittaker e) The diversity of organisms at species level is termed as: a. Alpha diversity b. Beta diversity c. Gamma diversity d. Delta Diversity	
30	Read the following passage and answer any **four** questions: The Lac operon consists of a regulator gene and three structural genes. The lactose act as an inducer. In the presence of an inducer such as lactose, the repressor is inactivated during the interaction. This allows RNA polymerase access to the promoter and transcription proceeds. . a) When the process of Lac operon is blocked by a repressor it represents: a. Positive regulation b. Negative regulation c. Sometimes positive sometimes negative d. Both positive and negative regulation b) Identify the correct sequence of the structural genes in the lac operon. a. Lac A, Lac Z Lac Y b. Lac Z, Lac A, Lac Y c. Lac Z. Lac Y, Lac A d. Lac A, Lac Y and Lac Z c) Which of the following is true in reference to the Lac operon process in *E. coli* ? i. Galactosidase is the only enzyme produced in large quantities when the operon is turned on. ii. The messenger RNA in the Lac operon is a polycistronic mRNA. a. Only i is correct. b. Only ii is correct c. Both i and ii are correct d. None of them are correct d) What provides a binding site to RNA polymerase? a. Exon b. Promoter c. Inducer d. Repressor e) The lac operon of *E.coli* contains genes involved in lactose metabolism. It is expressed only when lactose is -------- and glucose is ----------_. a. Present ; Absent b. Absent; Present c. More; Less	4

	d. Repressed; promoted	

Section E		
31	Explain oogenesis and show its various stages by flowchart or diagram. Or A large number of married couples the world over are childless. It is shocking to know that in India the female partner is often blamed for the couple being childless. (a) Why in your opinion the female partner is often blamed for such situations in India? Give any two views. (b) State any two reasons responsible for the cause of infertility. (c) Suggest a technique that can help the couple to have a child where the problem is with the male partner	5
32	Explain the life cycle of malarial parasite stating its various stages in human and female anopheles. *Or* What is the cause of cancer at the cellular level? Name the technique in which a piece of tissue is cut from the organ suspected for cancer. What are the different strategies used for the treatment of cancer.	5
33	Explain the process of transcription in eukaryotes. Write any two differences the transcription in Eukaryotes and Prokaryotes. Or (a) List the three different allelic forms of gene 'I' in humans. Explain the different phenotypic expressions, controlled by these three forms. (b) A woman with blood group 'A' marries a man with blood group 'O'. Discuss the possibilities of the inheritance of the blood groups in the following starting with 'yes' or 'no' for each: (i) They produce children with blood group 'A' only. (ii) They produce children some with 'O' blood group and some with 'A' blood group.	5