INDIAN SCHOOL MUSCAT

FINAL EXAMINATION

JANUARY 2021

SET A

CLASS XII

Marking Scheme – BIOLOGY [THEORY]

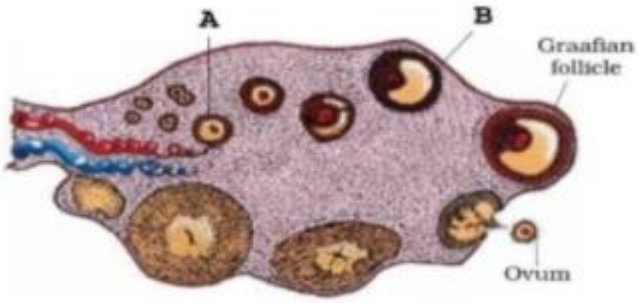
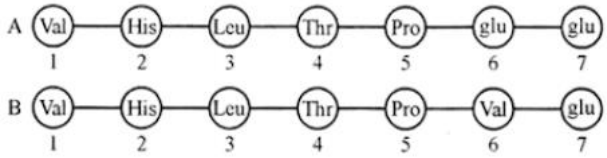
SECTION A

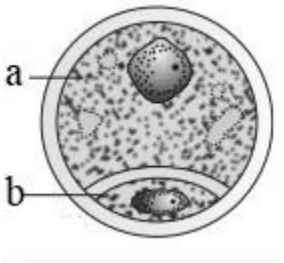
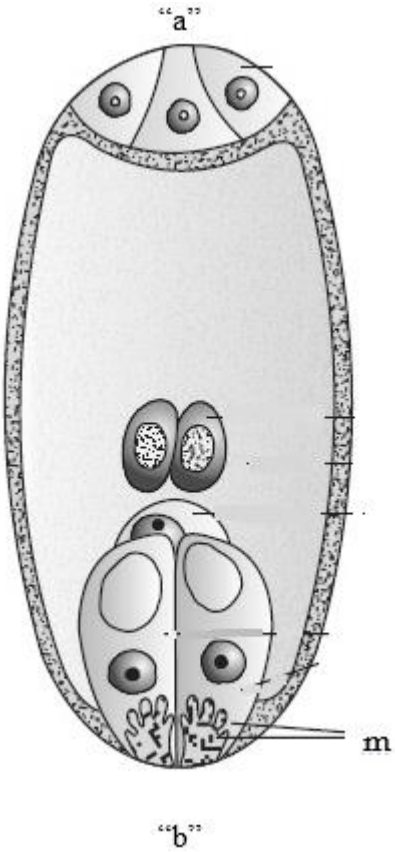
1.	Under what conditions plants develop inbreeding depression? Continued self-pollination	1
2.	How many pollen grains and ova are likely to be formed in the anther and the ovary of an angiosperm bearing 50 microspore mother cells and 50 megaspore mother cells respectively? 200 microspres and 50 ova.	1
3.	What is polyembryony? More than one embryo in a seed.	1
4.	Characters such as Skin colour and height in human show gradients and are not distinct. Also they are controlled by multiple genes. What is the inheritance of these characters known as? Polygenic inheritance	1
5.	Name the temporary store house of the sperm in human male. Epididymis	1
6.	A family has three children with blood group A, B, AB. What would be genotypes of the parents? I^AI^B and I^Bi or any relevant pair.	1
7.	What is transgenic animal? Animal that have their DNA manipulated to possess and express an extra gene.	1
8.	Suppose in mRNA strand the third base of a codon UAU is mutated to G. what will happen during translation process now? Become stop codon. Translation will not continue. ½ + ½	1
9.	How is mature insulin different from proinsulin? Absence of C PP chain in mature insulin	1
10.	Why are green algae not likely to be found in the deepest strata of the ocean? Wavelength of the light at the deepest strata is unsuitable for growth of green algae.	1
11.	**Assertion**: Lactose is inducer in Lac operon. **Reason:** Glucose acts as repressor. a. Both assertion and reason are true, and the reason is the correct explanation of the assertion. b. Both assertion and reason are true, but the reason is not the correct explanation of the assertion. c. Assertion is true but reason is false. d. Both assertion and reason are false**.** OR **Assertion:** UTRs are present at both 5' end and 3'end in mRNA. **Reason:** UTRs are required for efficient translation process. a. Both assertion and reason are true, and the reason is the correct explanation of the assertion. b. Both assertion and reason are true, but the reason is not the correct explanation of the assertion. c. Assertion is true but reason is false. d. Both assertion and reason are false	1

	c. Assertion is true but reason is false. OR a. Both assertion and reason are true, and the reason is the correct explanation of the assertion.	
12.	**Assertion:** Ti Plasmid is used as cloning vector. **Reason:** It has ability to deliver gene of our interest to variety of plant and it is modified so now no more pathogenic to plant. a. Both assertion and reason are true, and the reason is the correct explanation of the assertion. b. Both assertion and reason are true, but the reason is not the correct explanation of the assertion. c. Assertion is true but reason is false. d. Both assertion and reason are false a. Both assertion and reason are true, and the reason is the correct explanation of the assertion.	1
13.	**Assertion:** Predators can help in maintaining species diversity in a community. **Reason:** It is by reducing the intensity of competition among competing prey species. a. Both assertion and reason are true, and the reason is the correct explanation of the assertion. b. Both assertion and reason are true, but the reason is not the correct explanation of the assertion. c. Assertion is true but reason is false. d. Both assertion and reason are false a. Both assertion and reason are true, and the reason is the correct explanation of the assertion.	1
14.	**Assertion:** The life cycle of endoparasite is more complex. **Reason:** Endoparasite show extreme specialisation. a. Both assertion and reason are true, and the reason is the correct explanation of the assertion. b. Both assertion and reason are true, but the reason is not the correct explanation of the assertion. c. Assertion is true but reason is false. d. Both assertion and reason are false a. Both assertion and reason are true, and the reason is the correct explanation of the assertion	1
15.	Read the following and answer any four questions from 15(i) to 15 (v) given below: The environment is incomplete without microorganisms. With every breath you take, there are millions of microscopic organisms that you breathe in. Apart from that, the human body hosts a plethora of microbes both inside and outside. Besides this, they are a crucial part of the ecosystem and take part in activities like production of minerals like nitrogen, gases like oxygen, carbon dioxide, taking care of dead and decaying materials etc. microorganisms are beneficial for humans in various ways. They play an important role in human welfare and for the environment. These include processing and preservation of food, production of biomolecules, manufacture of pharmaceutical products, cosmetics industries, recycling the nutrients in the soil and so on.	4
(i)	The Dough used for making Idlis, Dosa and Bread are fermented by a) *Saccharomyces cerevisiae* and *Monascus purpureus* b) *Monascus purpureus* and bacteria c) Bacteria and *Saccharomyces cerevisiae* d) Yeast and Bacteria	
(ii)	Citric Acid is produced by *a) Aspergillus niger* *b) Clostridium butylicum* c) *Trichoderma polysporum* *d) Acetobacter acetii*	
(iii)	Methanogens are present in rumen of the cattle to a) Produce methane gas b) Break down cellulosic materials c) Break down lipids d) Produce methanoic acid.	

(iv)	*Trichoderma* are free living soil fungi found in soil ecosystem which facilitate a) Availability of nutrients to plants. b) in protecting plants from soil pathogens c) nitrogen cycle d) solubilizing phosphorus.	
(v)	**Assertion:** Biofertilisers are preferred to chemical fertilisers. **Reason:** Chemical fertilsers are more expensive than Biofertilisers and more hazardous to environment. a. Both assertion and reason are true, and the reason is the correct explanation of the assertion. b. Both assertion and reason are true, but the reason is not the correct explanation of the assertion. c. Assertion is true but reason is false. d. Both assertion and reason are false (i) c (ii) a (iii) b (iv) b (v) a	
16.	*Haemophilia* is characterized by uncontrolled bleeding and the inability of the blood to clot properly. Even a small cut or a minor injury can result in severe bleeding. *Haemophilia* is one among the man X-linked recessive inherited genetic disorders, Where the gene causing the disorder or dysfunction is located on the X-chromosome. When a haemophilic woman is married with a normal man, all the boys offspring will be haemophilic whereas all the girls offspring will be carrier of haemophilia. In other words 50% offspring will be haemophilic and 50% offspring will be carrier. When a haemophilic woman is married with a normal man, all the boys offspring will be haemophilic where as all the female offsprings will be carrier of haemophilia. In other words, 50% offsprings will be haemophilic and 50% will be carriers.	4
(i)	Haemophilia is caused by (a) Bacteria (b) Virus **(c) Genetic mutation** (d) Caused unknown	
(ii)	Rarely females experience the physiological defect of Haemophilia as they do so only when they are (a) Carrier for the defect (b) wives of haemophiliac husbands **(c) homozoygous for the defect** (d) heterozygous for the defect	
(iii)	*Haemophilia* is (a) X-linked (b) Y-linked (c) Z-linked (d) Autosomal	
(iv)	The reason why Haemophilia is more commonly observed human males than in females is due to (a) the disease is due to Y-linked recessive mutation **(b) the disease is due to X-linked recessive mutation** (c) as a huge population of girls die in infancy (d) the disease is due to X- linked dominant mutation.	
(v)	When a Haemophilia woman is married with a normal man, then what percentage of boys will be haemophilic? (a) **100%** (b) 50% (c) 25% (d) 75%	
	SECTION B	
17.	Define population explosion. Mention any two events that are inhibited by the intake of oral contraceptive pills to prevent pregnancy in humans. Tremendous increase in size and growth rate of population. 1 m Ovulation and implantation. ½ + ½	2
18.	Karyotype of person shows XXY chromosomes. Name the genetic disorder/disease likely to occur for a person and state two characteristic features of it. Klinefelter's syndrome 1	2

<table>
<tr><td></td><td>Overall masculine development/ sterile/ feminine character (Gynacomastia)</td><td></td></tr>
<tr><td>19.</td><td>What are Cyanobacteria? Give two examples. How do their existence in the paddy field benefit the crop?
Cyanobacteria are autotrophic microbes widely distributed in aquatic and terrestrial environments/ Anabaena, Nostoc, Oscillatoria/ as they fix nitrogen from atmosphere, acts as biofertiliser. ½+1+ ½</td><td>2</td></tr>
<tr><td>20.</td><td>Explain with a help of a suitable example the naming of a restriction endonuclease.
OR
We can produce the multiple copies of gene of interest by a process. Identify the process. How can we achieve gene amplification by this method?
EcoRI/ E- Genus name / co - second letter- species / R – strain I- order in which enzyme was isolated./ 4 X ½
OR
Polymerase Chain reaction/ Denaturation/ Annealing/ Extension 4 X ½
Exonuclease – removes nucleotides from the ends of DNA; Endonuclease- cuts at specific positions within DNA. 1m
Recognizes and cuts specific palindromic nucleotide sequences in the DNA 1m</td><td>2</td></tr>
<tr><td>21.</td><td>Explain the role of enzymes in the extraction of DNA from a bacterial cell in its purest form.
Treating cells with lysozyme to dissolve the bacterial cell wall. Ribonuclease- to remove RNA and protease for proteins. Other molecules can be removed by appropriate treatments thereby purifying DNA.1 + ½ + ½</td><td>2</td></tr>
<tr><td>22.</td><td>Bioreactors help for the large production of recombinant proteins. Name the two commonly used bioreactors. What is the purpose of stirring mechanism in a bioreactor?
OR
Fill in the blanks with suitable word.
<table>
<tr><td>A…….(a medicine)</td><td>Eli Lily, USA</td></tr>
<tr><td>B. ……...(a biological substance)</td><td>Human milk protein</td></tr>
<tr><td>C. ……(a medicine)</td><td>To treat emphysema</td></tr>
<tr><td>D. ……...</td><td>A transgenic cow, which produces human milk protein</td></tr>
</table>
Simple stirred bioreactor and sparged stirred bioreactor, facilitates mixing and oxygen availability. ½ + ½ + 1
OR
A. Human insulin B. alpha lactalbumin C. alpha antitrypsin D. Rosie</td><td>2</td></tr>
<tr><td>23.</td><td>The causes of biodiversity loss is designated as “evil quartet”. Name them.
The evil quartet
(i) Habitat loss and fragmentation
(ii) Over exploitation
(iii) Alien invasion
(iv) Co extinction</td><td>2</td></tr>
<tr><td>24.</td><td>Differentiate between natality and mortality. Write down the alphabet used to indicate natality and mortality.
Definition – ½ mark each.; natality – (B) and Mortality (D) ½ + ½</td><td>2</td></tr>
<tr><td>25.</td><td>Tropical Amazonian rainforest in South America has the greatest biodiversity on the earth. Do you agree with this? Explain.
Yes. I agree. ½
Tropical Amazonian rainforest has the greatest species richness. It contains > 40000 plant species, > 5000 vertebrates and > 1,25,000 species of invertebrates. ½ This is because tropical regions</td><td>2</td></tr>
</table>

	have constant environment/ and gets more solar energy. 1m	
	SECTION C	
26.	Observe the diagram provided.  Label the structures 'A'and 'B'. on which day ovum is released during menstrual cycle and name the process? Explain the structure formed after the release of ovum and mention its function. A- Primary follicle B- Tertiary follicle. ½ + ½ 14th day and ovulation ½ + ½. corpus luteum; secretes progesterone to maintain endometrium.1m	3
27.	The amino acid composition of the relevant portion of chain of two haemoglobin molecules (A & B) are shown below.  a. Which one of the polypeptide chain is abnormal? b. Name the disorder caused by it. c. What is the reason for this abnormality? d. What is the effect of this abnormality in such individuals? (a) Chain B. ½ (b) Sickle cell anaemia. ½ (c) This is due to the single base substitution at the sixth codon of the β globin gene from GAG to GUG. 1 (d) The mutant Hb molecule undergoes polymerization under low oxygen tension causing the change in shape of the RBC from biconcave disc to elongated sickle like structure. 1	3
28.	On which step of sewage treatment, activated sludge is formed? What is it formed of? What will happen once this sludge is sent to anaerobic sludge digesters? Second step/ biological treatment/ formed of bacteria and fungi/ anaerobic bacteria will digest them.	
29.	*Meloideqyne incognitia* is a nematode parasite infects the root of tobacco plants. its infection can be prevented by biotechnological methods. Name the strategy. Explain the principle behind this strategy. (a) RNA interference (RNAi). ½ (b) Nematode specific genes were introduced into the host plant through the Agrobacterium vector. 1 This gene produces both sense and antisense RNA in host cells. ½ These are complementary to each other and form dsRNA. ½ dsRNA silences the specific mRNA of the nematode. ½	3

30.	i) Snakes change their body temperature with changes in external temperature, but human beings not. Organisms may be classed according to above character with explanation. ii) Some type of Orchids lives on the branches of mango trees. The relationship between mango tree and Orchid is an example of? OR i) Define Allen's rule. ii) Write one morphological and physiological adaptation of a desert plant which enable them to live successfully in their habitat. Stenothermal and eurythermal – definition 2 m / commensalism 1m OR Allen's rule – 1m Morphological and physiological adaptation – 2 marks	3
	SECTION D	
31.	 (i) Name the structure shown in the picture and label the parts a and b. (ii) Where this cell is seen in a plant and explain the entire process of its formation. OR 	

	The given diagram is embryo sac of a flowering plant. i) Label the ends a and b. ii) On which cells the structure 'm' is seen and what is its role in fertilization? iii) What is the fate of each cell type shown in the diagram after fertilization? iv) Define the two events that occur during fertilization in this embryo sac. microspore or pollen grain ; a- vegetative cell b- generative cell 1 ½, Stamen //anther. Sporogenous tissue , Microspore mother cells// Pollen mother cells, meiosis, microspore tetrad, dehydration, microspore separate and develop into pollengrain ½ + 3 OR i) a- chalazal end b- micropylar end. 1 ii) synergids – ½ filiform apparatus – guides pollen entry ½ iii) synergids- disintegrate; antipodals – disintegrate; secondary nucleus – primary endosperm nucleus (endosperm); egg cell – zygote.2 iv) syngamy and Triple fusion – ½ mark each	
32.	What are two forms of *Streptococcus pneumoniae*, observed by the scientists Griffith and how do they differ from each other? How he brought out the 'transforming principle' by his experiment. OR Illustration below is a DNA segment, which constitutes a gene:  (i) Name the shaded and unshaded regions of a gene. (ii) Explain how these genes are expressed. (iii) How is this gene different from prokaryotic gene in its expression? S- type and R- type 1 mark; any two differences – 2 marks Brief explanation of the experiment – 2 marks OR i) Shaded – introns ; unshaded – exons 1 ii) Splicing ; capping and tailing ; primary RNA transcript into functional mRNA. 2 iii) Prokaryotes – no introns; structural gene is continuous; transcription and translation occurs continuously without splicing. 2	
33.	Why is tobacco in any form injurious to the health? Explain. OR Explain the replication of retrovirus (HIV) with suitable diagram. Tobacco – nicotin; stimulates adrnal gland; secretes adrenalin and nor adrenalin ; released into blood. Stimulates heart rate and blood pressure; Smoking – cancers associated with lungs, urinary bladder etc. Chewing – oral cancer; smoking – carbon monoxide; Hb binding , oxygen deficiency ; 10 X ½ OR Explanation – 2 marks ; correct diagram – 3 marks	
	End of the Question Paper	