INDIAN SCHOOL MUSCAT

FINAL EXAMINATION

JANUARY 2021

SET B

CLASS XII

Marking Scheme – BIOLOGY [THEORY]

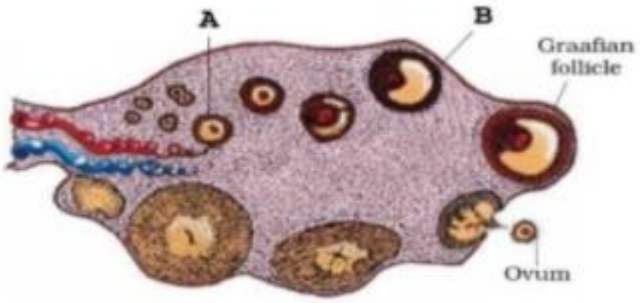
SECTION A

1.	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
2.	What is transgenic animal? Animal that have their DNA manipulated to possess and express an extra gene.	1
3.	What is polyembryony? More than one embryo in a seed.	1
4.	Under what conditions plants develop inbreeding depression? Continued self-pollination	1
5.	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
6.	Name the temporary store house of the sperm in human male. Epididymis	1
7.	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
8.	How is mature insulin different from proinsulin? Absence of C PP chain in mature insulin	1
9.	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
10.	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
11.	**Assertion:** Plasmids are extra chromosomal DNA**.** **Reason :** Plasmids are found in bacteria and are useful in genetic engineering 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 b. Both assertion and reason are true, but the reason is not the correct explanation of the assertion.	1
12.	**Assertion:** *Plasmodium vivax* is responsible for malaria**.** **Reason:** Malaria is caused by polluted water. 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 c. Assertion is true but reason is false.	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**: 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 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.	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.	What are *Baculoviruses*? To which genus it belongs ?why are desirable in IPM program? Pathogens that attack insects and other arthropods/ Nucleopolyhedrovirus/ to conserve beneficial insects in ecologically sensitive area. 1 + ½ + ½	2
18.	What type of biological diversity the following will be : a) Western Ghats has more amphibians than Eastern Ghats. b) 50000 strains of rice varities in India.	2
19.	The causes of biodiversity loss is designated as “evil quartet”. Name them. The evil quartet (i) Habitat loss and fragmentation	2

	(ii) Over exploitation (iii) Alien invasion (iv) Co extinction	
20.	Karyotype of person shows XO chromosomes. Name the genetic disorder/disease likely to occur for a person and state two characteristic features of it. Turner's syndrome 1 Lack of secondary characters/ sterile/ rudimentary ovaries	2
21.	EcoRI is a restriction endonuclease. What do E, Co, R, I represent? OR The DNA fragments can be separated using gel electrophoresis. a. Name the gel used in this technique and the source of the raw material used in this gel. b. Write the name of technique used to remove the DNA from the gel. *Eco*RI/ E- Genus name / *co* - second letter- species / R – strain I- order in which enzyme was isolated./ 4 X ½ OR (a) Agarose gel./ sea weed ½ each (b) Elution.1	2
22.	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	2
23.	How do you measure the population density of a) Fish in a pond. b) Tiger in a National park a) Number of fish per trap b) Pug marks and fecal pellets.	2
24.	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
25.	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. A…….(a medicine) — Eli Lily, USA B. ……...(a biological substance) — Human milk protein C. …….(a medicine) — To treat emphysema D. ……... — A transgenic cow, which produces human milk protein 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	2
	SECTION C	
26.	In a Snapdragon plant, when a plant with red colour is crossed to a plant with white colour flower, pink coloured flowers are produced. What is this phenomenon known as? Which Mendel's law is not followed in this cross? When a plant with pink colour flower is self-crossed how many types	3

	of flower phenotypes will appear? Write down the genotype of this cross. Show your working for F1 selfing of this cross. Incomplete dominance/ law of dominance/ three types / 1:2:1 2 marks Working 1 m	
27.	Draw different types of age pyramids for human population and name them. OR State Gause's "Competitive Exclusion Principle". On which condition this would apply? Mention an exemption to this principle. Expanding/ stable / declining age pyramids 1 ½ OR Principle – 1/ condition- resource limited – 1/ exemption – resource partitioning. 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.	3
29.	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
30.	*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
	SECTION D	
31.	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	

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.	(a) Where does spermatogenesis occur in human testes? Describe the process of spermatogenesis upto the formation of spermatozoa. (b) Trace the path of spermatozoa from the testes upto the ejaculatory duct only. OR (a) Explain the events taking place at the time of fertilization of an ovum in a human female. (b) Trace the development of the zygote upto its implantation in the uterus. Seminiferous tubules/ germ cells to primary spermatocyte to secondary spermatocyte to spermatids to spermatozoa ½ + 2 ½ SFT to vasa efferentia to epididymis to vas deferens 2 OR Role of acrosome/ digestion of egg membranes/ zona pellucida 2 ½ Zygote to morula to blastocyst and blastocyst structure 2 ½	
	End of the Question Paper	