

INDIAN SCHOOL MUSCAT
SECOND PRE-BOARD EXAMINATION
BIOLOGY
MARKING SCHEME
SET A

SECTION A

1.	Name the Geneticist who had worked on verification of chromosome theory of inheritance. Thomas Hunt Morgan	1
2.	What is the polarity of the Template strand supporting discontinuous synthesis of DNA? 5'to 3'	1
3.	Name the parasite which causes amoebiasis. <i>Entamoeba histolytica</i>	1
4.	Given below are a few impurities in urban wastewater. Select two colloidal impurities: ammonia, faecal matter, silt, bacteria, and calcium. Faecal matter and silt	1
5.	Can exonuclease be used while producing a recombinant DNA molecule? No.	1
6.	For which Indian rice variety was patent filed by a USA company? Basmati	1
7.	Why do plants in arid regions have sunken stomata? To prevent loss of water by transpiration	1
8.	Name the interaction between a whale and the barnacles growing on its back. commensalism	1
9.	Find out the odd one with respect to 'biodiversity hot spots'- Western ghats and srilanka (b) Indo-Burma (c) Himalaya (d) Gangatic plains Gangetic plains	1
10.	a	1
11.	c	1

12.	d	1
13.	b	1
14.	a/a	1
15.		4
(i)	b) wind	
(ii)	c) honey bee	
(iii)	a) stick on to the body of the insects	
(iv)	c) The pollen grains have mucilaginous covering	
(v)	a. Both assertion and reason are true, and the reason is the correct explanation of the assertion.	
16.		4
(i)	b) Proteases	
(ii)	b) <i>Mucor</i>	
(iii)	a) Amylases	
(iv)	d) Microbial enzymes can work only in normal temperature and pH.	
(v)	a) Amylases	
SECTION B		
17.	What is the end product of a) Triple fusion – Endosperm/PEN/PEC b) Division of megaspore in a flowering plant.- Embryosac 1 mark each.	2
18.	Structural genes in a transcription unit may be <u>monocistronic</u> or <u>polycistronic</u> . What do you mean by the terms underlined? Monocistronic – structural genes code for one polypeptide chain. Polycistronic – structural genes code of more than one polypeptide chains. 1m each OR a) Dies b) alive c) alive d) dies	2
19.	Identify the sex of organism as male or female in which the sex chromosome are found as (i) ZW in bird (ii) XY in Drosophila (iii) ZZ in birds. (iv) XO in grasshopper.	2

	i) Female ii) male iii) male iv) male	
20.	Why is an antibody represented H_2L_2 ? Made up of four polypeptide chains. Two heavy chains and two light chains. 1 mark each.	2
21.	Name an allergen and write the response of human body when exposed to it. Any one allergen. Mast cell secretes histamine and causes inflammation.(immune response) 1 mark each.	2
22.	What is the host called that produce a foreign gene product? What is this product called? Heterologous host and recombinant proteins 1 m each. OR Due to the actions of restriction endonucleases, ends of DNA fragment is left with single strands, which are capable of pairing up with the corresponding bases in the opposite strands.	2
23.	Which is the first transgenic cow? Which gene was inserted into it? Rosie, alpha lactalbumin	2
24.	How do seals adapt to their natural habitat? Explain. Blubber- thick fat layer under the skin ; insulator ; heat	2
25.	Mention the kind of biodiversity of more than a 1000 varieties of mangoes in India represent. How is it possible? The different varieties of mangoes in India represent genetic diversity. The vast genetic diversity is because India lies withing tropical latitudes giving it a constant and predictable environment. Also more solar energy is available which leads to higher productivity.	2
SECTION C		
26.	Enlist the types of IUDs with one example each. (a) Non-medicated (e.g., Lippes loop). (b) Copper releasing (e.g., CuT, Cu7, Multiload 375) (c) Hormone releasing (e.g., Progestasert, LNG-20) OR Sexually Transmitted Diseases will lead to other body complications if not attended at early stage. Explain those complications in detail. Which age group is more vulnerable to STDs? Pelvic inflammatory diseases (PID), abortions, still births, ectopic pregnancies infertility or even cancer of the reproductive tract. Adolescent age 14 to 40	3
27.	A red eyed male fruit fly is crossed with white eyed female fruit fly. Work out the possible genotype & phenotype of F1 & F2 generation. Comment on the pattern of inheritance in this	3

	<p>cross?</p> <p>When a red eyed is crossed with white eyed female fruitfly, offspring will have both white eyed male & red eyed female in 1:1 ration in F1 generation. In F2 generation, 50% females will be red – eyed & 50% will be white eyed, similarly, in males 50% will be red eyed & 50% will be white eyed. This result indicates that in sex-linked genes, males transmit their sex-linked characters to their grandson through their daughter; such type of inheritance is called criss-cross inheritance –</p> <p>The diagram illustrates criss-cross inheritance in fruit flies. In the P generation, a white-eyed female (X^wX^w) is crossed with a red-eyed male (X^RY). The F1 generation consists of red-eyed females (X^wX^R) and white-eyed males (X^wY). In the F2 generation, the white-eyed female (X^wX^w) and white-eyed male (X^wY) are crossed with the red-eyed female (X^RX^w) and red-eyed male (X^RY). The F2 generation shows a 1:1 ratio of red-eyed to white-eyed individuals in both sexes.</p>	
28.	<p>How many types of RNA polymerases are found in eukaryotes? Mention function of each RNA polymerase.</p> <p>RNA polymerase I transcribes rRNAs (28S, 18S, and 5.8S)</p> <p>RNA polymerase II transcribes precursor of mRNA, the heterogeneous nuclear RNA (hnRNA).</p> <p>RNA polymerase III is responsible for transcription of tRNA, 5srRNA, and snRNAs (small nuclear RNAs).</p>	3
29.	<p>(i) Expand BOD. (ii) At a particular segment of a river near a sugar factory, the BOD is much higher than the normal level. What is it indicative of? What will happen to the living organism in this part of the river? (iii) Under what conditions will the BOD be lowered in the river? How will it affect the aquatic life?</p> <p>biochemical oxygen demand./ Highly polluted with organic wastes/ Suffocate or die due to lack of dissolved oxygen/after digesting organic wastes/ improve the species 6 X ½</p>	3
30.	<p>Why should biodiversity be conserved? Explain giving three reasons.</p>	3

	Broad utilitarian view/narrow utilitarian view / ethical reason – 1 mark each.	
SECTION D		
31.	<p>How are spermatogenesis different from Oogenesis? Describe the role of hormones in regulating the function of male reproductive system.</p> <p>Any two differences – 2m ; hormones – 3 m</p> <p style="text-align: center;">OR</p> <p>Name the functions of the following:</p> <p>(a) Corpus Luteum (b) Endometrium (c) Acrosome (d) Sperm tail (e) Fimbriae</p> <p>a) to secrete progesterone to maintain endometrium; b) for implantation c) to release enzymes to digest egg membranes d) For swimming d) to collect ovum after ovulation</p>	5
32.	<p>Explain Hershey and Chase experiment to proof that DNA is the genetic material.</p> <p>Explanation or diagram – 5 marks</p> <p style="text-align: center;">OR</p> <p>Explain the process of packaging DNA in Eukaryotes with a diagram.</p> <p>DNA of eukaryotes is wrapped around positively charged histone proteins to form nucleosome.</p> <p># Nucleosome contains 200 base pairs of DNA helix.</p> <p># Histone octamer = 2(H2a+H2b+H3+H4)</p> <p># Linker DNA bears H1 protein</p> <p># Chromatin fibres formed by repeated units of nucleosomes.</p> <p># Non histone proteins required for packaging. 6x ½ = 3m</p> <p>Diagram – 2 m</p>	5
33.	<p>One of the main objectives of biotechnology is to minimize the use of insecticides on cultivated crops. Explain with the help of a suitable example how insect resistant crops have been developed using techniques of biotechnology.</p> <p>Bt toxin gene is isolated from <i>Bacillus thuringiensis</i>, this gene is incorporated in the cotton plant , using a vector , the plant is now a Bt cotton and it produces crystals of protoxin , which is an insecticidal protein , when the insect ball worm infects the cotton plant the toxin is taken in , pH of the gut solubilises these crystals , converts it into active form , which binds to the epithelial cells of the gut, causes swelling , leads to lysis and results in death of insect = ½ × 10</p> <p style="text-align: center;">OR</p> <p>(a) How is mature insulin different from proinsulin secreted by pancreas in humans?</p> <p>(b) Explain how was human functional insulin produced using rDNA technology.</p> <p>(c) Why is the functional insulin thus produced considered better than the ones used earlier by diabetic patients?</p>	5

	<div> <div> <div>(a)</div> <table border="1"> <thead> <tr> <th></th><th>Proinsulin</th><th>Mature Insulin</th></tr> </thead> <tbody> <tr> <td>(i)</td><td>It has A, B and C polypeptide strands</td><td>It has only A and B polypeptide strands</td></tr> <tr> <td>(ii)</td><td>It is non functional</td><td>It is functional</td></tr> </tbody> </table> <div>= $\frac{1}{2} \times 2 = 1$</div> </div> <div> (b) Two DNA sequences corresponding to its A and B chains were prepared, and were introduced in plasmids of <i>E. coli</i> , to produce insulin chains, chains A and B were produced separately, extracted, and combined by creating disulphide bonds = $\frac{1}{2} \times 6$, </div> <div> (c) Because it does not develop allergy or other type of reactions which was developed by the use of insulin used earlier = 1 </div> </div>		Proinsulin	Mature Insulin	(i)	It has A, B and C polypeptide strands	It has only A and B polypeptide strands	(ii)	It is non functional	It is functional	
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