

INDIAN SCHOOL MUSCAT
SECOND PRE-BOARD EXAMINATION
FEBRUARY 2020

SET A

CLASS XII

Marking Scheme – BIOLOGY [THEORY]

Q.NO.	Answers	Marks (with split up)
1.	d) Ozone	1
2.	d) Agarose Gel Electrophoresis Or a) Bt Cotton	1
3.	d) antigen-antibody interaction	1
4.	c) discourage female infanticide	1
5.	c) interspecific hybridization OR c) Blue revolution	1
6.	Gross primary productivity of an ecosystem is the rate of production of organic matter during photosynthesis Secondary productivity is defined as the rate of formation of new organic matter by consumers.	2
7.	Lichens , they secrete acids, to dissolve rocks, which result in weathering and soil forms, leads to growth of bryophytes OR Definition and explanation 1+1	2
8.	<i>Thermus aquaticus</i> produces a thermostable, DNA polymerase, when DNA is denatured at high temperature, this enzyme remains active = $\frac{1}{2} \times 4$	2
9.	During the secondary treatment of the primary affluent (Primary effluents are passed into a large aeration tank, where it is constantly agitated , and air is pumped into it) vigorous growth of useful aerobic microbes , into flocs takes place , these microbes use major part of the organic matter and this reduces BOD = $\frac{1}{2} \times 4$	2
10.	a) Replication – DNA dependent DNA polymerase $\frac{1}{2} + \frac{1}{2}$ b) Transcription – DNA dependent RNA Polymerase $\frac{1}{2} + \frac{1}{2}$	2
11.	(a) Linkage: - Physical association of genes on a chromosome, - Two genes did not segregate independently of each other - F ₂ (phenotypic) ratio deviates (significantly) from 9:3:3:1 (Any two) = $\frac{1}{2} \times 2$ Recombination: -Tightly linked genes tend to show fewer recombinant frequency / 1.3% = $\frac{1}{2}$ - Loosely linked genes show higher percentage of recombinant frequency / 37.2% = $\frac{1}{2}$	2
12.	Frog -External fertilization / in water / outside the body , release of motile gametes / large number of gametes/ synchronised maturation of ova and sperms = $\frac{1}{2} + \frac{1}{2}$ Moss - Internal fertilization / inside the body of organism , male gametes are motile / large number of gametes. = $\frac{1}{2} + \frac{1}{2}$	2

13.	<p>Blastocyst stage = 1</p> <p>Process: Cells of blastocyst are arranged into an outer layer trophoblast (and an inner cell mass) / Trophoblast gets attached to endometrium , blastocyst becomes embedded in the endometrium of the uterus (and this is) called implantation = $\frac{1}{2} \times 2$</p>	3								
14.	<p>(i) a) Klinefelter's Syndrome b) Turner's Syndrome 1+1</p> <p>(ii) Individuals with abnormal number of chromosomes / Down's Syndrome / Turner's Syndrome / Klinefelter's Syndrome (or any other correct example) 1</p> <p>OR</p> <p>Ans (a) (i) $4 - X X^h, = \frac{1}{2}$ $X = \text{normal}$ $5 - X^h Y, = \frac{1}{2}$ $X^h = \text{haemophilic}$ $6 - XY, = \frac{1}{2}$ $\frac{1}{2} \times 3 = 1 \frac{1}{2}$</p> <p>(b)</p> <div><div><div>14</div><div>$X^h X$</div></div><div><div>15</div><div>$X Y$</div></div></div> <div><div>$X^h X$</div><div>$X^h Y$</div><div>XX</div><div>XY</div></div> <div>$= \frac{1}{2},$</div> <p>25% chances of haemophilic male, = 1</p> <p>[$1 \frac{1}{2} + \frac{1}{2} + 1 = 3$ Marks]</p>	3								
15.	<p>(a) GGAA and ggaa $\frac{1}{2} \times 2 = 1$</p> <p>(b) plant with green pod and axial flower; GgAa $\frac{1}{2} \times 2 = 1$</p> <p>(c) Green Seed : Green Seed : Yellow Seed : Yellow Seed Axial flower : Terminal Flower : Axial Flower : Terminal Flower 9 : 3 : 3 : 1</p>	3								
16.	<p>A colony of bacteria (say A) growing in a given medium has built in variation in terms of ability to utilise a feed component, a change in the medium composition would bring out only that part of the population(say B) that can survive under the new conditions ,= 1+1</p> <p>In due course of time this variant population outgrows the others and appears as new species thus organisms with shorter life-cycle or life-span will undergo evolution faster / for the same thing to happen in fish or fowl would take millions of years as life spans of these animals are in years. =1</p>	3								
17.	<p>(i) Acid in Stomach/Saliva in mouth/tears in eyes (Any two) = $\frac{1}{2} + \frac{1}{2}$</p> <p>(ii) (a) Streptococcus pneumoniae/ Haemophilus influenzae,Rhinoviruses (b)</p> <p>(b) Different symptoms (any two) = $\frac{1}{2} + \frac{1}{2}$</p> <table><tr><th>Pneumonia</th><th>Common cold</th></tr><tr><td>Infects alveoli of lungs</td><td>Infects nose & respiratory passage</td></tr><tr><td>chills</td><td>Sore throat</td></tr><tr><td>Lips /fingers may turn grey to black</td><td>Hoarseness</td></tr></table>	Pneumonia	Common cold	Infects alveoli of lungs	Infects nose & respiratory passage	chills	Sore throat	Lips /fingers may turn grey to black	Hoarseness	3
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	<p>(c)</p> <p>(c) Common symptoms (any two) = ½ + ½</p> <table border="1"> <tr> <td>Pneumonia</td> <td>Common cold</td> </tr> <tr> <td>Cough</td> <td>Cough</td> </tr> <tr> <td>Headache</td> <td>Headache</td> </tr> </table> <p>OR</p> <p>(i) B-lymphocytes : Produce antibodies = 1 T-lymphocytes : Help B-lymphocytes to produce antibodies / kills the pathogen directly (Killer T-cells)= 1</p> <p>(ii) When a vaccine / heat killed pathogen / attenuated pathogen / weakened pathogen / a preparation of antigenic proteins of pathogen is introduced into the body to prevent chicken pox / measles / any other example it produces antibodies against antigen / pathogen , = 1 It generates B and T memory cells that recognize the pathogen quickly on subsequent exposure , to produce large amount of antibodies which inactivate the pathogen causing the disease = ½ + ½ (Any other correct example of a disease can also be substituted)</p>	Pneumonia	Common cold	Cough	Cough	Headache	Headache	
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18.	<p>Isolation of Bt toxin genes from <i>Bacillus thuringiensis</i> , incorporated into corn, toxin coded by gene cry IAb in corn, kills the pests/ pest dies. =½× 4</p> <p>Protoxin to toxin in alkaline pH seen in the gut of the insect and causes swelling and lysis of the midgut cells. 1m</p>	3						
19.	<p>(a) Inbreeding - Mating of more closely related individuals within the same breed for 4-6 generations. Outbreeding- Breeding of unrelated animals may be of the same breed, but having no common ancestors for 4-6 generations/ different breeds/ different species. = ½ + ½</p> <p>(b) Advantages- develops pure line / increase homozygosity, accumulation of superior genes, elimination of less desired genes. = ½ × 3 Disadvantages- Reduces fertility/ causes inbreeding depression. = ½</p>	3						
20.	<p>Knowledge of the nature and habits of bees / selection of suitable location for keeping the beehive / catching and hiving of swarms (group of bees) / management of beehives during different seasons / handling and collection of honey and bee wax (Any four) = ½ × 4 - <i>Apis indica</i> = 1</p>	3						
21.	<p>(a) No = ½ These algal mass (algal bloom) causes deterioration of the water quality , increase fish mortality , are (extremely) toxic to humans and animals, imparts distinct colour to water bodies (Any three) = ½ + ½ + ½</p> <p>(b) Presence of large amount of nutrients / nitrates and phosphates/ nitrogen and phosphorus in water body = 1</p> <p>OR</p> <p>Broad/narrow/ ethical view – one each.</p>	3						

22.	Australia/ adaptive radiation/ reason 1 m each	3																
23.	3 regions – 1 function each	3																
24.	Three parts 1 ½ ; diagram 1 ½	3																
25.	<p>(a) Castor = 1 (b) endosperm stores reserve food materials / provides nutrition to the developing embryo =1 [2 Marks] (c) Tapetum- Microsporogenesis ,Microsporangium(Anther), nourishes the developing pollen grains. Synergids -Megasporogenesis, Megasporangium(ovule), synergids have filiform apparatus to guide the pollen tube into it. ½ × 6</p> <p style="text-align: center;">OR</p> <p>(a)</p> <table border="1"> <thead> <tr> <th></th><th>Spermatogenesis</th><th>Oogenesis</th></tr> </thead> <tbody> <tr> <td>Time of initiation</td><td>At puberty</td><td>During foetal stage/ embryonic stage</td></tr> <tr> <td>Site of completion</td><td>Seminiferous tubule</td><td>Fallopian tube / Ampullary - isthmic junction / Ampullary region</td></tr> <tr> <td rowspan="3">Nature of meiotic division</td><td>Equal cell division/</td><td>Unequal cell division/</td></tr> <tr> <td>Continuous cell division/</td><td>Suspended/ arrested at early embryonic stage/</td></tr> <tr> <td>Formation of four daughter cells/ spermatids</td><td>Formation of one egg / Ovum</td></tr> </tbody> </table> <p style="text-align: center;">= ½ × 6</p> <p>(b) GnRH acts on anterior pituitary to secrete LH and FSH , LH acts on Leydig cell and stimulates synthesis and secretion of androgens , androgen stimulates spermatogenesis , FSH acts on sertoli cells which stimulate secretion of some factors which helps in the process of spermiogenesis = ½ × 4</p>		Spermatogenesis	Oogenesis	Time of initiation	At puberty	During foetal stage/ embryonic stage	Site of completion	Seminiferous tubule	Fallopian tube / Ampullary - isthmic junction / Ampullary region	Nature of meiotic division	Equal cell division/	Unequal cell division/	Continuous cell division/	Suspended/ arrested at early embryonic stage/	Formation of four daughter cells/ spermatids	Formation of one egg / Ovum	5
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26.	<p>DNA is packaged in the cell in the following manner:</p> <p>(a) As Nucleosomes consists of Histone octamer around which the positively charged DNA is wrapped around to form a nucleosome. A typical nucleosome contains 200bp of DNA helix.</p> <p>(b) Repeated units of nucleosomes then form chromatin (in a nucleus). The nucleosomes represent the “Beads on String” structure” as seen in electron microscopic picture.</p> <p>(c) These are then further coiled and condensed at metaphase stage to form chromosomes.</p> <p>(d) For packaging of chromatin at higher level, non-histone proteins are required.</p> <p>OR</p> <ul style="list-style-type: none"> • Heterogamety is production of two different types of gametes (either in male / female) = 1 	5																

	<p>• Sex determination in <i>Drosophila</i> X X (female) / X Y (male) type =1/2</p> <p>Female (XX) produces only one type of gamete with X chromosome but the male produces two different types of gametes with either X or Y chromosome=1/2</p> <p>When a male gamete with X fuses with the female gamete it produces a female progeny (XX)=1/2</p> <p>When a male gamete with Y fuses with the female gamete it produces male progeny (XY)=1/2</p> <table><tr><td>Sutton and Boveri</td><td>Mendel</td></tr><tr><td>1. Chromosomes occur in pairs</td><td>1. Factors occur in pairs</td></tr><tr><td>2. Chromosomes segregate at the time of gamete formation such that only one of each pair is transmitted to a gamete</td><td>2. Factors segregate at gamete formation stage and only one of each pair is transmitted to a gamete</td></tr><tr><td>3. Independent pairs of chromosomes segregate independently of each other</td><td>3. One pair of factors segregate independently of another pairs</td></tr></table>	Sutton and Boveri	Mendel	1. Chromosomes occur in pairs	1. Factors occur in pairs	2. Chromosomes segregate at the time of gamete formation such that only one of each pair is transmitted to a gamete	2. Factors segregate at gamete formation stage and only one of each pair is transmitted to a gamete	3. Independent pairs of chromosomes segregate independently of each other	3. One pair of factors segregate independently of another pairs	
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27.	Any 5 problems -5 m OR One significance each	5								