MARK SCHEME

TRIAL EXAM BIOLOGY S3 STPM 2020

SECTION A (MULTIPLE-CHOICE)

Answer key

Question Number	Key	Question Number	Key	Question Number	Key
1	**A**	6	**A**	11	**D**
2	**C**	7	**B**	12	**D**
3	**A**	8	**C**	13	**C**
4	**C**	9	**B**	14	**D**
5	**A**	10	**B**	15	**B**

SECTION B (STRUCTURE)

16.	(a)	(i)	• respiration / heat;
		(ii)	• decomposers / saprobionts / bacteria / fungi / micro-organisms;
	(b)	(i)	• $= \dfrac{20810}{1700000} \times 100\%$; • $= 1.22\%$;
		(ii)	• $= 20810 - 13192$; • $= 7618$ $\underline{kcal/m^2/yr}$;
	(c)	(i)	• 21;
		(ii)	• 5065;
17.	(a)	(i)	• *W* : Regulator (gene);
		(ii)	• *X* : Repressor (molecule);
		(iii)	• *Y* : Operator (gene);
		(iv)	• *Z* : Structural (gene);
	(b)		• lactose;
	(c)		• The genes would be constitutively expressed; • β-galactosidase would not be produced; *Any 1*
	(d)		• Transcription of structural genes occurs to produce mRNA // *β*-galactosidase enzyme is produced continuously with or without lactose;

18.	(a)	(i)	1. Sporophyte dominant generation	1
			2. Have true roots, stems and leaves	1
			3. Have xylem and phloem tissues / tracheids and sieve tube but no vessels and no companion cells	1
			4. Produce heterosporous / megaspores (embryo sac) and microspores (pollen grain)	1
			5. Reproductive organ called cone / no flower	1
			6. Naked ovule / no ovary /ovule not protected by ovary	1
			7. Seeds produce not protect by fruit	1
				Max : 4
		(ii)	1. Asymmetry body	1
			2. Body wall consist of two layers of cell //Inner layer lining by collar cells / choanocytes //Mesoglea contain amebocytes between the two layers	1
			3. Single opening serving as anus and mouth // Single body cavity	1
			4. Numerous pore / porocytes in body wall	1
			5. Skeleton called spicules	1
			6. Sessile	1
				Max : 4
	(b)		1. Ex situ conservation	1
			2. collect / take, plants / seeds, from the wild from many countries / international effort	1
			3. (especially) from areas at risk from climate change / endangered species.	1
			4. grow / plant, seeds / plants (in botanic gardens) to increase, plant / seed, number	1
			5. maintain genetic diversity	1
			6. cooperate with, governments / agencies / universities, for research	1
			7. to conserve habitats / to restore habitats	1
			8. to reintroduce species to wild /natural habitat	1
			9. educate / raise awareness of public	1
				Max : 7
				Total : 15 M

19	a)	Prezygotic isolating mechanism	
		1. <u>Ecology / habitat isolation</u>	1
		2. Different species reproduce in different habitats	1
		3. <u>Behavioural isolation</u>	1
		4. Different species have distinct courtship behaviour	1
		5. <u>Mechanical isolation</u>	1
		6. Different species have structural differences in their reproductive organs	1
		7. <u>Gametes isolation</u>	1
		8. Gametes of different species are genetically incompatible	1
		9. <u>Temporal isolation</u>	1
		10. Different species reproduce / flower at different times	1
			Max 6
		Postzygotic isolating mechanism	
		11. <u>Hybrid inviability</u>	1
		12. Zygote fails to develop	1
		13. <u>Hybrid sterility</u>	1
		14. Hybrid fails to produce functional gemmate	1
		15. <u>Hybrid breakdown</u>	1
		16. F_2 generation fail to develop / are infertile	1
			Max 4
			Max 10

(b)	1. Balance(d) polymorphism	1.Transient polymorphism	1
	2. Two or more morphs coexist in a stable ratio (from generation to generation)	2. The favoured morph become dominant and the other are eliminated	1
	3. Frequency of the two alleles are not change / are stable // maintenance of both two different alleles of a gene over time	3. Frequency of the two alleles changes / are not stable // the progressive replacement of one allele of a gene by another allele	1
	4. Both alleles involved	4. One allele involved	1
	5. Morphs in the population are not under strong selection pressure	5. Morphs in the population undergoing a strong selection pressure	1
	6. Example : heterozygous advantage in sickle cell anemia in Africans	6. Example : Dark Peppered Moth	1

1 + Any 4

Max : 5

Total : 15 M

20	(a)	(i)	1. Can carry / accept foreign genes	1
			2. Have(one or more) unique restriction site	1
			3. Contains a selectable marker gene //Contains gene resistance to the antibiotic (ampicillin / tetracycline (ampR))	1
			4. Containing a second selectable gene / Lac Z gene	1
			5. Replicates independently of host chromosome /contain origin of replication	1
			6. Small in size,(contain only 1000 – 10 000 base)	1
			7. Known DNA sequence, therefore allows for better manipulation by genetic engineers	1
			8. Easy to isolate from bacteria (by broken the cell and centrifuged)	1
			9. Easy to return back into bacteria(because bacteria will take the plasmid naturally)	1
				Max :7
		(ii)	1. Can accept large amounts of foreign DNA.	1
			2. High transfection efficiency // naturally transfer recombinant DNA into cell that they attack with almost 100% success.	1
				Max :2

	(b)		1. Performed between 8 – 12 weeks of pregnancy	1	
			2. A narrow tube is inserted through the cervix /A needle is inserted through the abdomen wall into uterus of pregnant woman.	1	
			3. and suctions out a tiny sample of fetal tissue from placenta	1	
			4. Position of needle and foetus is monitored by ultra sound	1	
			5. The cells are cultured	1	
			6. Biochemical analysis / DNA analysis is done to detect metabolic disorder	1	
			7. Karyotyping is done to detect chromosomal abnormalities / genetic disorder / sex of the foetus	1	
			8. To detect chromosomal abnormalities / genetic disorder / sex of the foetus	1	
				Max : 6	
				Total : 15 M	

SKEMA JAWAPAN TAMAT