964/1/2

OTI 2 STPM
2011

JABATAN PELAJARAN TERENGGANU

BIOLOGY
MARKING SCHEME

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Dibiayai oleh:
KERAJAAN NEGERI TERENGGANU

MARKING SCHEME OTI 2 2011 PAPER 2
SECTION A

No	Suggested Answer	Mark
1(a)	Lechitin	1
(b)	A- saturated fatty acid B- unsaturated fatty acid C-glycerol	1 1 1
(c)	Ester bond	1
(d)	A has no double bond between carbon atoms while B has a double bond between carbon atoms	1/0
(e)	The phospholipid consists of a hydrophilic head which faces towards the outside The hydrophobic tail ahich faces towards the inside away from water	1 1
(f)	It allows lipid soluble substances to pass through in and out of the cell It is a matrix for attachment of protein molecules	1 1
	TOTAL	10 MARKS
2(a) (i)	Carrot/ tomatoes/cucumber The flowering of some plants unaffected by photoperiodism	1 1
(ii)	Long day plants All plant s flower when the period of daylight exceeds 14 hours Very few plants flower when the peiod of daylight less than 10 hours	1 1 1
(b)(i)	Short day plant. The plant flowers if it is exposed to contihuous dark treatment that is more than the critical night length period in a 24 hour cycle	1 1
(ii)	Flowering in plant depend on the last type of light i is exposed to dring the critical night period Exposure to red light does not cause flowering Effect of exposure to red light during the night period is cancelled by subsequent exposure to far red light	1 1 1
	TOTAL	10 MARKS
3(a)(i)	Graph P : Unlimited growth It is produced following an annual serial of smaller sigmoid curve Graph Q : intermittent growth Growth only takes place for a short period of time during ecdysis before the new skin hardens	1 1 1 1
(ii)	It does not show growth in other dimensions such s in dry mass	1
(b)	Ecdysone stimulates ecdysis process by activating specific genes that control the synthesis of enzymes involve in the synthesis of endoskeleton Juvenile hormone suppresses the gene that control the production of adult characteristics.	1 1
(c)	Limited growth. Growwth in certain dimensions of the boy such as height inceases until it reaches a maximum value Then the growth in dimension stop	1 1 1
	TOTAL	10 MARKS
4(a)	DNA that contains genes from more than one source	1
(b)	Step I ; insertion of the DNA fragment into plasmid Step II: Transformation/introducing recombinant DNA into host cell Step III : DNA cloning/amplification making multiple copies of target gene	1 1 1
(c)	To produce the same sticky/ blunt ends which are complementary to each other	1

(d)	Cultured in a medium containing antibiotics/ampicilin and X-gal before a blue-white screening Hybridization by using genetics/adioactive probes	1 1
(e)(i)	Insulin produced through genetic engineering is similar to human insulin Insulin produced is non-allergic Cheaper/ not costly	1 1 1 Any 2
(ii)	Because DNA/gene only codes for the synthesis of a protein and blood is not a protein	1
	TOTAL	10 MARKS

Marking scheme oti 2 2011- ESSAY

NO.	SUGGESTED ANSWER	MARK
5(a)	(i) - the target tissue is the endometrium layer in the uterus - the hormone helps to maintain the thickness and vascularisation of the endometrium layer in the uterus as preparation for implantation of blastocyst (ii) – the target tissue is the endometrium layer in the uterus -The hormones stimulates the thickening and vascularisation of the endometrium of the uterus and the development of glands in the uterine wall after menstruation (iii) – the target tissue is the uterine muscle or mammary glands - the hormone causes uterine contraction at birth and stimulates milk flow from the mammary glands (iv) – the target tissue is the mammary glands. - it stimulates mammary glands to secrete milk	1 1 1 1 1 1 1 1 Max 8
5 (b)	-germination starts when a dormant embryo in a seed start to grow -first, imbibitions of water occurs. -Water enters the seed through the microphyle and testa and is absorbed by collidial substances inside the seed (such as protein, starch and hemicelluloses) -the seed swells and the seed coat raptures -the raptured testa allows more water to enter the seed. (oxygen is also absorbed) -water is required for the vacuolation of growing cells as well as used in the hydrolysis of stored food -water dilutes absisic acid (which prevents seed germination) it is also used to translocate hydrolysed food substances -the embryo synthesized gibberellins which stimulates the aleuron layer to synthesized α-amylase and other hydrolytic enzymes -starch is hydrolysed to glucose , protein to amino acids and lipids to fatty acids and glycerol. -these hydrolysed product are used by the embryo to grow	1 1 1 1 1 1 1 1 1 1 Max 7 marks
6(a)	Gene mutation is the change in the sequence of nucleotide bases of the DNA that corresponds to a particular gene in an organism - also known as point mutation. - frameshift mutation and missense mutation are different forms of gene mutation. - Chromosomal mutation is the change in the structure of the chromosome also known as chromosomal aberration - or the change in the number of the chromosomes in an organism.	1 1 1 1 1

	- aneuploidy and euploidy which consists of allopolyploidy and autopolyploidy are different forms of chromosomal mutation.	1 1 Max 4
6 (b)	The four possible ways that gene mutation can occur are through substitution, inversion, insertion, and deletion. - in substitution, a nucleotide base pair is replaced by another base pair in the DNA nucleotide sequence of the gene. - and they are usually missence mutations as the new nucleotide base alters one genetic code to a different code which may still code for an amino acid but it is a different amino acid. - an example of genetic disorder caused by substitution is sickle-cell anaemia, where the base thymine in the code for glutamic acid is substituted by the base adenine in the gene that codes for the (3- 1 polypeptide chain. - in inversion, two or more nucleotide base pairs have been reversed in the DNA base sequence within the gene. - the altered genetic code may result in a different amino acid in the polypeptide chain and the formation of a non-functional protein. - in insertion, an extra nucleotide base pair is inserted into the DNA base sequence of a gene causing the whole base sequence to be shifted one place backward. (frameshift mutation) - in deletion, a nucleotide base pair is deleted from the DNA base sequence of a gene causing the whole base sequence to be shifted one place forward. - both insertion and deletion are frameshift mutation and every single triplet code after the insertion or deletion point is altered. - insertions and deletions are usually more harmful than substitution and inversion because of the frameshift mutations which often lead to production of non-functional proteins. - β- Talassaemia major is a genetic disorder caused by the deletion of a base in the β-globin allele and this results in a lack of β-polypeptide chains of the haemoglobin molecule.	1 1 1 1 1 1 1 1 1 1 1 Max 8
6 (c)	Down syndrome is an example of aneuploidy that is instead of 46 chromosomes there are 47 chromosomes in the individual. - it is a result of non-disjunction during meiosis. - the two chromosomes number 21 fail to separate during anaphase I or anaphase II of meiosis. - the gametes produced contain 24 chromosomes (2 copies of chromosome 21) and 22 chromosomes (no chromosome 21) -when a sperm containing 23 chromosomes fuses with an ovum containing 24 chromosomes and the zygote formed contains three chromosome 21, trisomy. - the individual may be a male or female usually with flat, broad faces, slanted eyes, short palms and are mentally retarded.	1 1 1 1 1 1 Max 4
7(a)	The humoral immune response protects against free-floating antigents. The defence involves antibodies secreted by B cells Vaccines stimulates B cells to produced memory B cell that are represent for a long period after the antigen has been fought off. The steps involved in acquiring active immunity through humoral response: 1. firstly, a macrophage ingests the antigen that is present in the blood	1

	2. the antigen is then destroyed by enzymes in the macrophage 3. the fragments of the antigen combine with MHC class II proteins and the macrophage becomes an antigen-presenting cells (APC) 4. the APC interacts with a helper T cell 5. the APC is stimulated to secreted interleukin-I 6. Interleukin-I then stimulates the helper T cells to secretes interleukin-2 7. Interleukin-2 stimulates the helper T cell to proliferate and produce even more interleukin-2 8. Interleukin -2 stimulates the development of B cell 9. The activated B cell proliferate and form clones of plasma cell and memory B cell 10. The B cell also get activated by interacting with free antigen 11. The activated helper T cells bind to the B cells is an APC for the same antigen 12. Plasma B cells released antibodies specific for the antigen. Memory B cells express antibody on their surfaces and become important for the secondary immune response	1 1 1 1 1 1 1 1 1 1 Max 10 m
7(b)	(i) plasma cell – secrete antibodies (ii) helper t cell – stimulates immune response by B and cytotoxic T cells (iii) macrophage – destroys microbes and alerts other immune cells (iv) Cytotoxic T cell – destroys cell with foreign antigens on their surface, attack virus infected cells and cancerous cells (v) Suppressor T cell – inhibit immune responses by other lymphocytes	1 1 1 1 1 5 m
8(a)	(i) Epistasis -one gene masks or suppresses the action of another gene. -epistasis gene also known as inhibiting genes -the genes involved are found at different gene loci. -e.g. of epistsis is the coat colour of mice. (agouti, black and white) (ii) Polygenic inheritance - one particular characteristic is controlled by two or more than two different genes - genes located at different loci on different chromosomes -each dominant allele has a small quantitative effect individually on the phenotype// phenotype produced is the total effect of all dominant genes present - e.g. height in human	1 1 1 1 Max 3 1 1 1 1 Max 3 Total 6

8(b)

Parents (p)

1 Phenotype: Red smooth seed x White wrinkled seed

1 Genotypes: R R / S S x r r / s s

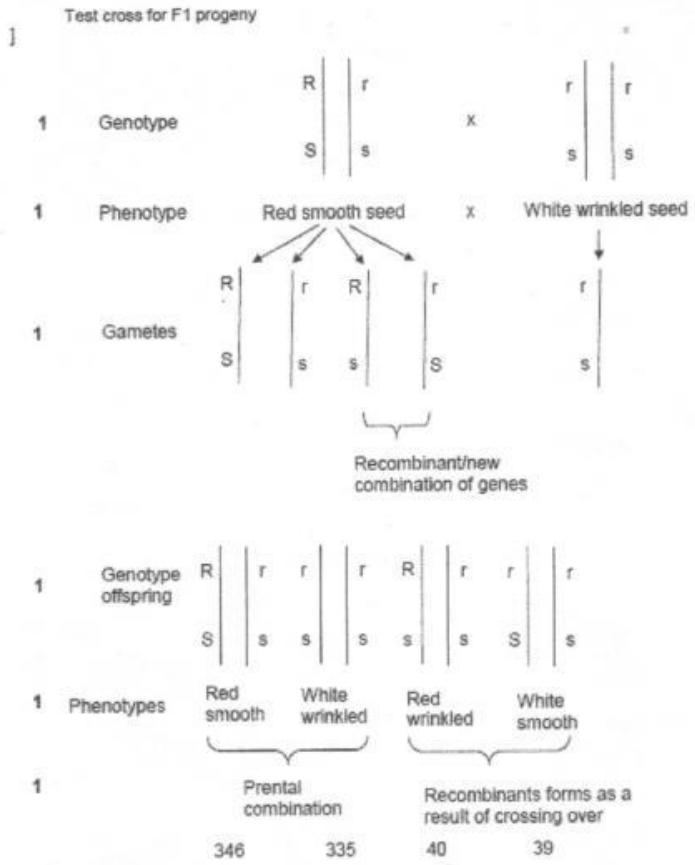
Meiosis

1 Gametes: R / S and r / s

Fertilisation

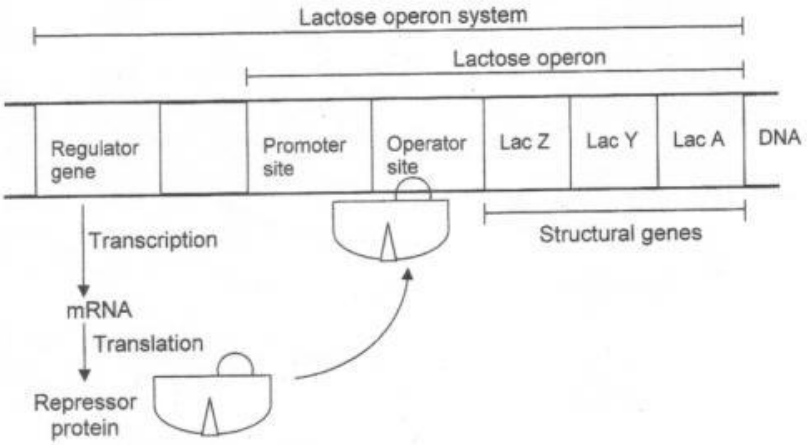
1 F1 generation genotype: R r / S s

Phenotype: All red and smooth seed

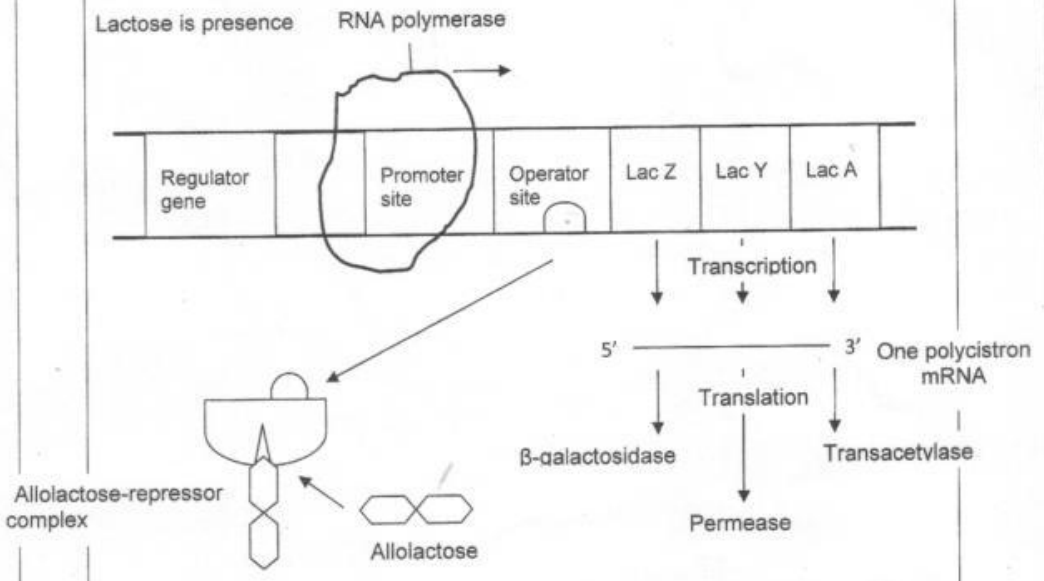
	] Test cross for F1 progeny  	Max 9 marks
9 (a)	-regulator gene is always transcripted to form repressor proteins, so repressor proteins are always present in the cell. -if lactose is not present in the cell, the repressor protein binds to the operator site of the lactose operon -the repressor protein is structurally large to cover part of the promoter site -RNA polymerase cannot bind to the promoter site -transcription of the structural genes in lactose operon is blocked in the presence of lactose, a small amount of lactose is converted to its isomer, allolactose -allolactose acts as an inducer -allolactose binds to the allosteric site on the repressor protein and alters the configuration of the repressor protein -allolactose-repressor complex detaches from the operator -RNA polymerase attaches on the promoter site of the lactose operon -lactose operon is actively transcribe , producing one mRNA -mRNA is translated, β-galactosidase, permease and transacetylase are produced -lactose metabolism continues until all lactose is metabolized	

-when lactose level in the cell drops, allolactose frees itself from the repressor protein
-the repressor protein binds to the operator site and transcription of the operator site and the transcription of the structural genes in lactose operon is blocked.

9(a) Lactose not presence



Lactose is presence



9 (b)	-in the production of the transgenic bacteria, the bacteria may become a super resistance bacteria -genetically engineered organisms may transmit novel genes to the wild population and in the process may create harmful organisms -this may reduse the genetic diversity and the organisms may become more susceptible to pathogens -information obtained by the huaman genom project may be misused by certain parties to produce humans with better physical and mental capabilities -genetic engineering is disturbing the natural selection process in the environment -genetically modifised food may caused allergies or other side effects to humans	1 1 1 1 1 1 max
10 (a)	The species is the basic unit of biodiversity -it is defined as a group of organisms with similar features which can interbreed to produce fertile offspring, and which are rerproductively isolated from other species	2/0
10 (b)	-Definition for species varied because it serves a certain purpose -earlier definition are often problematic today as they do not take into consideration recent scientific knowledge such as of DNA code -the weaknesses of the definition according to the biological species concept, two organisms belong to the same species if the can mate and produce viable offspring. The problem with this definition is that it relies on reproductive behavior. Therefore it contains the following weakness: 1. it cannot be applied to fossil species 2. it is not applicable to organisms that reproduce asexually 3. it cannot be applied to populations that are geographically isolated as it is difficult to determine with absolute certainty whether such population are capable of interbreeding 4. it cannot be applied to species that do not reproduced through meiosis and 8ertilization	1 1 1 1 1 1 Max 5
10 (c)	(i) Prezygotic isolating mechanisms (these act before fertilization occurs) -different species may fail to show suitable mating behavior -Two subpopulation may occupy different habitats in the same area and thus fail to meet at breeding time -in plants, a shift in the time of flowering between species may prevent pollination between populations -structural differences in the sex organs of different species may prevent interbreeding -in interspecies fertilization, sperms may fail to reach or fuse with the eggs (ii) Postzygotic isolating mechanism -even if a zygote is formed, genetic differences may become so great that the resulting hybrids are less viable or less fertile than the parental types. An example is the sterile mule produce by mating a horse with a donkey -sterility in males produced by interspecies by hydridisation is more common than in females. In fact, it is the most common postzygotic isolating mechanism -when *Drosophila melanogaster* attempts to mate with it relative *Drosophila simulans*, no viable males are produced. This is caused by incompatible mutation in a single gene that are carried by one of t he parents to the hybrid male.	1 1 1 1 1 1 Max 4 1 1 1 1 4 max Total 8