

MOCK TEST - 2018

BIOLOGY

MARKING SCHEME

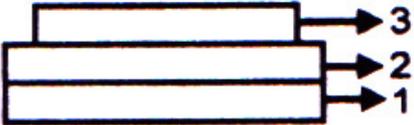
1.	In vivipary, the embryos develop into young ones inside the womb or uterus of the mother. There is limitation of space and nourishment that the mother can provide. Therefore, the number of offspring become limited from one to a few only.	1		
2.	DNA polymerase enzyme is highly specific to recognize only deoxyribonucleoside triphosphates (dNTPs). Therefore, it cannot hold ribo nucleosides.	1		
3.	Similarities in biochemicals such as DNA help in deriving the line of evolution. Organisms with more similar DNA sequences are considered close relatives or have evolved from the same ancestor.	1		
4.	(i) Polymerase Chain Reaction (PCR) (ii) ELISA	1		
5.	<i>Berberis nilghiriensis</i> .	1		
6.	Incompatibility does not allow the pollen of same genotype to develop on the stigma. (i) It prevents in breeding and out breeding. (ii) Pollen promotion or inhibition occurs only after pollen recognition of pollen pistil interaction. (iii) Only right mating type of pollen will germinate and fertilize. (iv) Interaction of chemical substance of pollen and style act as natural barrier. (v) Pollens of other mating types are discarded.	2		
7.	According to Darwin, fitness ultimately refers to reproductive fitness. Those who best fit in an environment, reproduces well and survive. Hence, they are selected by nature. He called it natural selection and implicit it as a mechanism of evolution.			
8.	(i) Trichoderma (fungus) is used for control of several plant pathogens. (ii) Nucleopolyhedrovirus is species specific and narrow spectrum insecticide and does not show any negative impact on plants, mammals, birds, fish or non-target insects.	2		
9	(i) Enzymes Pectinases and proteases clarify bottled juses. (ii) Swiss cheese has large holes because a bacterium <i>Propionibacterium sharmanii</i> produces CO ₂ .	2		
	<p style="text-align: center;">OR</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> <p>B-Lymphocytes B-cells form humoral or Antibody-mediated immune System (AMIS)</p> <p>They defend against viruses and Bacteria that enter the blood and Lymph</p> <p>They form plasma cells and memory</p> </td> <td style="width: 50%; border: none; vertical-align: top;"> <p>T-Lymphocytes T-cell form cell-mediated immune system (CMIS)</p> <p>They defend against pathogens including protists and fungi that enter the cells.</p> <p>They form killer, helper and</p> </td> </tr> </table>	<p>B-Lymphocytes B-cells form humoral or Antibody-mediated immune System (AMIS)</p> <p>They defend against viruses and Bacteria that enter the blood and Lymph</p> <p>They form plasma cells and memory</p>	<p>T-Lymphocytes T-cell form cell-mediated immune system (CMIS)</p> <p>They defend against pathogens including protists and fungi that enter the cells.</p> <p>They form killer, helper and</p>	
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	<p>Cells by the division.</p> <p>(b) Hepatitis-B vaccine is produced from surface antigens of transgenic yeast by rDNA technology. The antigens represent whole protein vaccine.</p>	<p>Suppressor cells by the division Of lymphoblasts.</p>	
10	<p>Water in young lake is cold clear to support life</p> <p style="text-align: center;">↓</p> <p>With time, water is enriched with nutrients such as nitrogen and phosphorous by streams draining into it</p> <p style="text-align: center;">↓</p> <p>As Lake's fertility increases plant and animal life increases or proliferates.</p> <p style="text-align: center;">↓</p> <p>Organic matter begins to get deposited at the bottom of lake silt and organic debris pile up and makes the lake shallower and warmer.</p> <p style="text-align: center;">↓</p> <p>Marsh plants develop roots and begin to fill the original lake basin.</p> <p style="text-align: center;">↓</p> <p>Water body gets filled with larger masses of plants.</p> <p style="text-align: center;">↓</p> <p>Converted to land.</p>		2
11.	<p>Estrogene is at peak on 13th-14th day. Progesterone is at peak on 21st-23rd day.</p>		3
12.	<p>(a) Following measures have been followed to check population growth:</p> <p>(i) Propagating the use of contraceptive methods by all fertile couples.</p> <p>(ii) Advertisement in media to motivate people for having smaller families, e.g., "Hum Do Hamare Do"</p> <p>(iii) Raising of marriageable age of female to 18 years and that of males of 21 years.</p> <p>(iv) Incentives given to couples with small families.</p> <p>(b) MTP is allowed if</p> <p>(i) Child has congenital disorder.</p> <p>(ii) Pregnancy as a result of rape or contraceptive failure.</p> <p>(iii) Pregnancy is harmful for mother.</p>		3
13.	<p>(a) Alleles are polymorphs that differ in their nucleotide sequence resulting in contrasting phenotypic expression. Alleles are the alternative forms of a same gene, e.g. genes for height hae two alleles, one for dwarfness (t) and one for tallness (T). Significance oif alleles are:</p> <p>(i) A character may have two or more contrasting phenotypic expression, thus resulting in variation in a population.</p> <p>(ii) These are used in the studies of inheritance and in understanding their behave</p> <p>(b) Punnett square can be effectively used to understand the independent segregation of the two pairs of genes during meiosis.</p>		3
14.	<p>(i) Pedigree analysis is carried out for studying inheritance of human traits. It is also useful when studying species with a long generation time.</p> <p>(ii) The common Mendelian experiments are not possible in humans because</p>		3

	(a) Generation period is long (b) Progeny of a couple is small.	
15.	When more than one adaptive radiation appear to have occurred in an isolated geographical area and two or more groups of unrelated animals come to resemble each other for similar mode of life or habitat, it is called convergent evolution. Convergent evolution of Australian marsupials and placental mammals are example of this evolution.	3
16.	(a) (i) Aphids (ii) Jassids, Aphids and fruit borer (iii) Okra (Bhindi) (b) Mutational breeding helped in producing disease resistant varieties in mung bean crop specially against yellow mosaic virus and powder mildew.	3
17.	(a) Chromosomes are less related in inter specific crosses thus sterile progeny is produced e.g. mule, whereas chromosomes are totally unrelated in intergeneric crosses thus crosses are almost unknown. (b) e.g. 250 kg cow produces 200 gm of protein per day. In same span, 250 gm of micro-organism like Methylophilus methylotrophus can produce 25 tonnes of protein due to high rate of biomass production and growth.	3
18.	(a) Yes, (i) Productivity, (ii) Stability, (iii) Increased biodiversity (b) Red Data List is a catalogue of species facing risk of extinction. It contains description of taxonomic characteristics, conservation status and distribution information about Taxa.	3
19.	(a) Ahmed Khan created a material called polyblend. Polyblend is fine power of recycled modified plastic. It is mixed with Bitumen to be used in roads. Its raw material is plastic waste. (b) Characteristics of a modern landfill include: * Methods to contain leachate such as lining clay or plastic liners. * Compaction and covering of the waste to prevent it from being blown by wind. * Installation of a landfill gas extraction system to extract the gas for use in generation of power.	3
20.	(a) In case of ligation at Sal I site, the transformant loses the tetracycline resistance while, in case of Puv I, the transformant loses ampicillin resistance. (b) The experiment with not likely to be affected as recombinant DNA molecule is circular and closed, with no free ends. Hence, it will not act as a substrate for exonuclease enzyme, which removes nucleotides from the free ends of DNA.	3
21.	Bt toxin genes were isolated from the bacterium Bacillus thuringiensis and incorporated into several crops like cotton. The choice of the genes depends on the crop and the targeted pest, as most Bt toxins are insect group specific. The toxin is coded by a gene named 'cry', e.g. genes cry IAc and cry IIAb control cotton bollworms and that of cry IAb controls corn borer.	3
	OR After identifying a useful gene in bacteria, following steps should be undertaken. Isolation of useful gene using restriction endonuclease ↓	

	<p>Transferring the gene to a suitable vector to create a recombinant DNA molecule.</p> <p style="text-align: center;">↓</p> <p>Transfer of these recombinant DNA molecules to the target cells.</p> <p style="text-align: center;">↓</p> <p>Screening of cells for transformation.</p> <p style="text-align: center;">↓</p> <p>Selection of transformed cells.</p> <p style="text-align: center;">↓</p> <p>Regeneration of plants from the transformed cells to get transgenic plants.</p>	
22.	<p>(a) CaCl_2 is known to increase the efficiency of DNA uptake to produce transformed bacterial cells. The divalent Ca^{2+} ions create transient pores on the bacterial cell wall by which the entry of foreign DNA is facilitated into the bacterial cells.</p> <p>(b) *</p> <ul style="list-style-type: none"> * Microinjection * Biolistics/gene gun * Heat-shock method * Using disarmed pathogen vectors 	3
23	<p>(i) Mohan must have observed one or more of s following symptoms: Drop in academic performance, unexplained absence from college, lack of interest in personal hygiene isolation and fatigue, deteriorating relationships with friends and family, loss of interest in hobbies, change in eating and sleeping habits, fluctuations in and weight.</p> <p>(ii) Causes/reasons for drug abuse:</p> <ul style="list-style-type: none"> (a) Curiosity. (b) Need for adventure. (c) Excitement. (d) Experimentation. (e) To escape from stress. Unsupportive family structure. <p>(iii) (a) Mohan must inform Raghu's parents to appropriate measures. (b) Talk to Raghu to find out the cause behind sJsm drugs. (c) He must be taken to a psychologist/ psychtatn get rid of drug abuse.</p> <p>(iv) Mohan's empathy, his concern for his friend helping nature.</p>	
24	<p>(a) For inducing parthenocarpy fruits like grapes, lemon, oranges, watermelon etc. can be selected because such seedless fruits will be of high economic importance.</p> <p>(b) Bagging technique. Technique of covering the emasculated flower with bag (preferably butter paper) to prevent the contamination of its stigma with unwanted pollens is called bagging.</p> <p>Uses:</p> <ul style="list-style-type: none"> • Stigma is protected from contamination from unwanted pollens. • When stigma of bagged flowers attains receptivity, desired pollens can be dused and flower can be rebagged for hybridization. 	

	<p>(c) Members of Asteraceae/grasses/citrus/mango species undergo apomixes.</p> <p>(d) The embryo development starts only after a certain amount of endosperm is formed; it is an adaptation for assured nutrition of the developing embryo. So endosperm development precedes embryo development. Provides nourishment to the developing embryo. It is a result of triple fusion.</p> <p>(e) In geitonogamy, pollen grains are transferred from anther to stigma of another flower of same plant and involves a pollinating agent as in cross pollination, but pollen grains come from same plant so it is genetically similar to autogamy.</p>	
	OR	
	<p>(a) At embryonic life. Oocyte complete oogenesis when sperm enters for fertilization.</p> <p>(b) When a sperm comes in contact with Zona pellucid of the ovum, it increases changes in membrane that block entry of additional sperms. Thus it ensures only one sperm can fertilise.</p> <p>(c) Parturition signals arise from fully developed foetus and placenta that causes foetal ejection reflex in form of mild uterine contractions. Oxytocin secreted by both mother and foetus under positive feedback stimulating stronger and stronger uterine contractions.</p> <p>(d) * Epididymis helps in quick movement of sperms for pushing them out during ejaculation.</p> <ul style="list-style-type: none"> • It helps to store and nourish maturation of sperms. 	
25.	<p>(a) Primary productivity of an ecosystem depends on the type of producer and its number. Since ecosystems are different, so their primary productivity is also different.</p> <p>(b) Decomposition depends on the type of detritus (substrate), soil moisture, temperature condition. Lignin, chitin rich detritus, low moisture soil and low temperature slows the decomposition.</p> <p>(c) As 10% law of Lindeman (1942), energy and biomass transfer from one trophic level to next trophic level is only 10%. As a lion eats a deer, 10 kg of flesh will be converted into only 1 kg flesh of lion. The rest is used in providing energy for body activities.</p> <p>(d) Nature tends to increase gross primary productivity. As plants convert solar energy into produce by the process of photosynthesis these plants enhance gross primary productivity. Man tends to increase the Net primary productivity.</p> <p>Human activities help harvest the gain from plants thus net primary productivity decreases. Also activities like deforestation, industrialization has affected primary productivity.</p>	
	OR	
	<p>(a) Role of predation</p> <ul style="list-style-type: none"> • Predation help in biological method of pest control. • Predation helps to check the ecological balance in nature. • Predation helps in maintaining species diversity as in absence of predator there will be relatively more interspecific competition. • Predation has enhanced the adaptation in prey. <p>(b) Pyramid of biomass is always upright but exceptionally can be</p>	

	<p>inverted as number of fishes in sea may exceed the phytoplanktons.</p> <p>(c) Coral reefs are formed in area of high salinity where no fresh water inflow is there and with little or no siltation. Such conditions are found in Tamil Nadu but not in West Bengal.</p> <p>(d) Zero population growth: When tendency to increase is balanced by tendency to decrease in such a way the population growth rate is almost zero.</p>	
26.	<div style="text-align: center;">  </div> <p>I. (a) *</p> <ul style="list-style-type: none"> * The deoxyribonucleoside triphosphates are the building blocks for the DNA strand (polynucleotide chain) is as substrate. * These also serve as energy source in the form of ATP and GTP from two terminal phosphates. <p>(b) Lac operon is switched on by adding lactose in the medium, as lactose acts as inducer and makes repressor inactive. Due to this, β-galactosidase is formed which converts lactose into glucose and galactose. As soon as lactose is consumed, repressor again becomes active and cause switching off the system.</p> <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> • NH_4Cl (ammonium chloride) • It is to show that after one generation of E. coli with ^{15}N-DNA, in a medium of ^{14}N, the DNA was of intermediate density between the light and heavy DNA. It shows that out of the two strands, only one strand is synthesized newly, using the ^{14}N-nitrogen source in the medium. • The heavy and light DNA molecules can be differentiated by centrifugation in a cesium chloride (CsCl) density gradient. The ^{15}N-DNA and the hybrid ^{15}N-^{14}N-DNA had density intermediate of the two. • Scientists concluded that the DNA replication is semiconservative, i.e. of the two strands of DNA, one is the parental strand, while another is newly synthesized. <p>II. Unambiguous code means that one codon codes for only one amino acid, i.e. AUG codes only for methionine. Genetic code is universal, as particular codon codes for the same amino acid in all organisms.. It is degenerate because some amino acids are coded by more than one codon, e.g. UUU and UUC, both code for phenylalanine.</p>	