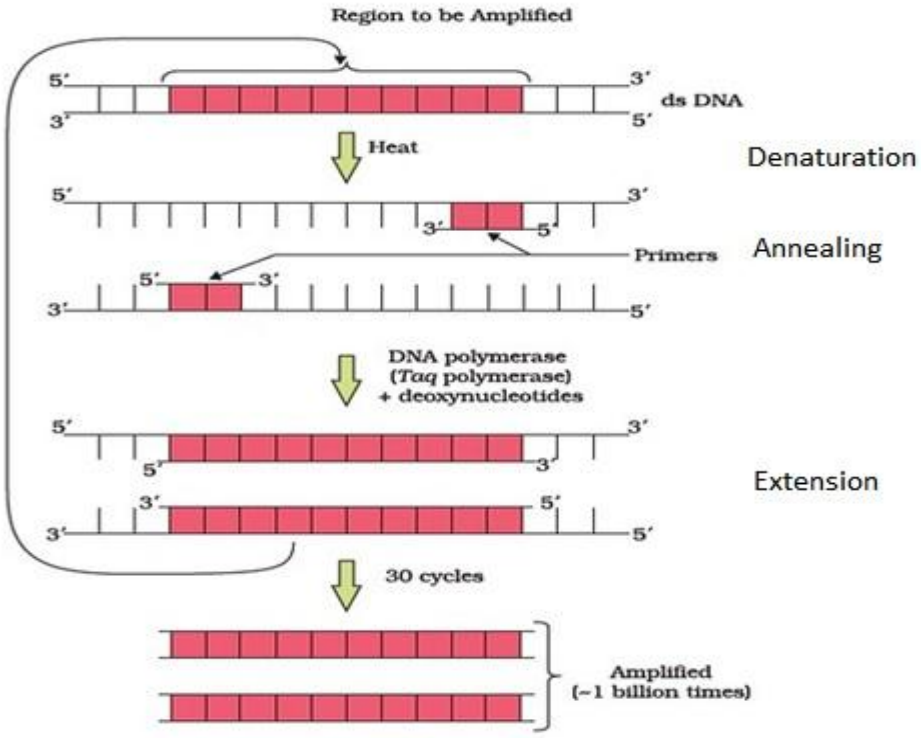
MARKING SCHEME (SQP)
CLASS XII
BIOLOGY (044)
TERM II (2021-22)

Q. No.	Section A	Marks
1	Microbial pathogens enter the gut of humans along with food: • Physical barriers: Mucus coating of the epithelium lining the gastrointestinal tract helps in trapping microbes entering our body. (1 Mark) • Physiological barriers: Acid in the stomach, saliva in the mouth prevent microbial growth. (½+½ Mark)	2
2	Streptokinase (produced by the bacterium *Streptococcus)* is used as a 'clot buster' for removing clots from the blood vessels of patients who have undergone myocardial infarction. (1 mark) Statins (produced by the yeast *Monascus purpureus)* act as blood-cholesterol lowering agents. (1 mark) **OR** Eradication of pests will disrupt predator-prey relationships, where beneficial predatory and parasitic insects which depend upon flora and fauna as food or hosts, may not be able to survive. (1 mark) Holistic approach ensures that various life forms that inhabit the field, their life cycles, patterns of feeding and the habitats that they prefer are extensively studied and considered. (1 mark)	2
3	It is Morphine. (1/2 mark) Physically it appears as a white, odourless, crystalline compound. (1½ mark)	2
4	At collection points A and B, the BOD level is high due to high organic pollution caused by sugar factory and sewage discharge. (1 mark) At the collection point C, the water was released after secondary treatment/ biological treatment (where vigorous growth of useful aerobic microbes into flocs consume the major part of the organic matter present in the river water or effluent due to sugar factory and sewage discharge). (1 mark)	2

5	This interaction will lead to competition between the individuals of population A,B and C for resources. Eventually the 'fittest' individuals will survive and reproduce. (1 mark) The resources for growth will become finite and limiting, and population growth will become realistic. (1 mark)	2
6	The relationship between the plant and pollinator is called mutualism. Fig depends on wasp for pollination, and wasp depends on fig for food and shelter. (1 mark) With the decline in population of figs, wasp loses its source of food and shelter. (1 mark) **OR** Regulators; Thermoregulation, Osmoregulation Birds/mammals (any one) (½ x 4 Marks)	2
	SECTION B	
7	Transformation of normal cells into cancerous neoplastic cells may be induced by following physical, chemical or biological agents causing DNA damage: ● Ionising radiations like X-rays and gamma rays ● Non-ionizing radiations like UV. ● Chemical carcinogens present in tobacco smoke ● Cellular oncogenes (c-onc) or proto-oncogenes, when activated under certain conditions cause cancer. Viruses with oncogenes can transform normal cells to cancerous cells. (any 3; 1 x 3 marks) **OR** If the person has sustained high fever (39° to 40°C), weakness, stomach pain, constipation, headache and loss of appetite, it is Typhoid. (1 mark) If the person has fever, chills, cough and headache; and the lips and fingernails turn gray to bluish, it is Pneumonia. (1 mark) If the person has chills and high fever recurring every three to four days then, it is Malaria. (1 mark)	3
8	● When our body encounters an antigenic protein or a pathogen for the first time it produces a response which is of low intensity and our body retains memory of the first encounter. (1 mark) ● The subsequent encounter with the same pathogen elicits a highly intensified response carried out with the help of two special types of lymphocytes present in our blood, B-	3

	lymphocytes, and T-lymphocytes. (1 mark) ● The B-lymphocytes produce an army of proteins in response to these pathogens into our blood to fight with them. These proteins are called antibodies. The T-cells themselves do not secrete antibodies but help B-cells produce them. (1 mark)	
9	The flow chart shows the three steps involved in the process of PCR showing the following - Denaturation The DNA strands are treated with a temperature of 94^0C (Heat) and the strands are separated. - Annealing The primers anneal to the complementary strands - Extension The DNA polymerase facilitates the extension of the strands. (1x3=3 marks) **OR**  Diagram : Polymerase Chain Reaction	3
10	a. When a large habitat is broken into small fragments due to various activities, mammals and birds requiring large territories and certain animals with migratory habitats are badly affected, leading to population decline. (1 mark) b. ● Nile perch introduced in Lake Victoria eventually led to the extinction of an ecologically unique assemblage of more than 200 species of cichild fish.	3

	● Parthenium/Lantana/water hyacinth caused environmental damage and threat to our native species ● African catfish-*Clarias gariepinus* introduced for aquaculture purposes is posing a threat to the indigenous catfishes in our rivers. (Any one) (1 mark) c. Yes; Humans have overexploited natural resources for their 'greed' rather than 'need' leading to extinction of these animals. Sustainable harvesting could have prevented extinction of these species. (1 mark)	
11	a. India's history of religious and cultural traditions emphasized the protection of nature. In many cultures, tracts of forest are set aside, all the trees and wildlife within are venerated and given total protection. Sacred groves in many states are the last refuges for a large number of rare and threatened plants. (2 marks) b. Area A will have more species richness and a steeper slope. (1 mark)	3
12	a. Band III corresponds to 2500 base pairs, and Band IV corresponds to 100bp. (½ + ½ mark) b. The fragments will resolve according to their size. The shorter sequence fragments would move farthest from well as seen in Band IV (100 bp) which is lighter as compared to Band III which is heavier being 2500 base pairs. (1 mark) The significance of electrophoresis is to purify the DNA fragments for use in constructing recombinant DNA by joining them with cloning vectors. (1 mark)	3
SECTION C		
13	a. The two different DNA molecules will have compatible ends to recombine. (½ mark) b. Restriction enzyme cuts the DNA of the vector and then ligates the gene of interest into the DNA of the vector. (1 mark) c. 2 fragments (½ mark) 5' ATTTTGAG 3'5'GATCCGTAATGTCCT 3' 3' TAAAACTCCTAG 5'.3'GCATTACAGGA 5' (1 mark) d. BamH1 site will affect tetracycline antibiotic resistance gene, hence the recombinant plasmids will lose tetracycline resistance due to inactivation of the resistance gene. (1 mark) Recombinants can be selected from non recombinants by plating into a medium containing tetracycline, as the recombinants will not grow in the medium because the tetracycline resistance gene is cut. (1 mark)	5

	OR a. Farm Land II. (½ mark) Bt crop. (½ mark) Because the use of pesticides is highly reduced for Bt crop // Decrease of pesticide used is also more significant for Bt crop. (1 mark) b. In Bt cotton a cry gene has been introduce from bacterium *Bacillus thuringiensis* (Bt) which causes synthesis of a toxic protein. This protein becomes active in the alkaline gut of bollworm feeding on cotton, punching holes in the lining causing death of the insect. (2 marks) However; a Non Bt crop will have no effect on the cotton bollworm/ the yield of cotton will decrease / non Bt will succumb to pest attack. (1 mark)	

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