

SOLUTIONS
Biology (Subject Code-044)
(PAPER CODE : 57/1/2) (26-01-44N)

Q.No.	EXPECTED OUTCOMES/VALUE POINTS	Marks	Total Marks
SECTION-A			
1.	(C) / a b c d v iv ii i	1	1
2.	(A) / <i>Lactobacillus</i> and Yeast	1	1
3.	(C) / (i) (ii) (iii) (iv) Seminiferous tubule Urethra Scrotum Epididymis	1	1
4.	(B) / Bio-prospecting	1	1
5.	(B) / Ligaments	1	1
6.	(D) / Zooplankton	1	1
7.	(D) / Papaya	1	1
8.	(A) / Tomato and Potato	1	1
9.	(A) / Jaintia hills	1	1
10.	(D) / Normal DNA from heavy DNA	1	1
11.	(C) / DNA ligase	1	1
12.	(B) / Independent assortment of genes	1	1
13.	(A) / Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation for Assertion (A).	1	1
14.	(C) / Assertion (A) is true, Reason(R) is false	1	1
15.	(D) / Assertion (A) is false, Reason (R) is true	1	1
16.	(C) / Assertion (A) is true, Reason(R) is false	1	1
SECTION B			
17.	(a) LAB (Lactic acid bacteria) produce acids that coagulate and partially digest the milk proteins and converting milk into curd. (b) -Increase the content of vitamin B12 in curd/ improve nutritional quality of curd by increasing vitamin B12 content. -LAB check the disease causing microbes in our stomach	1 ½ ½	2
18.	(a) • Muscular layer -Myometrium Glandular layer – Endometrium	½ ½	

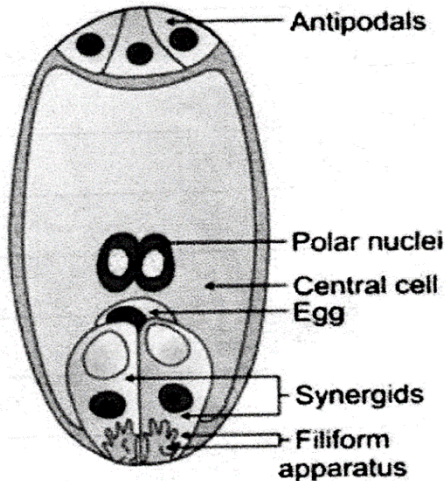
	Function Myometrium exhibits strong contractions during delivery of the baby. Endometrium undergoes cyclical changes during menstrual cycle / helps in implantation of blastocyst / takes part in formation of placenta. OR (b) (i) STI are not detected in time due to -Absence or less significant symptoms in early stages of infection. -Social stigma attached to STIs. (ii) PID or Pelvic Inflammatory disease, abortions, ectopic pregnancy, still births, Infertility, cancer of reproductive tract. (Any two)	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$	2
19.	(a) Ori (Origin of replication)- It is a specific DNA sequence responsible for initiating replication /control copy number of linked DNA. (b) Polymerase in PCR Amplification of DNA at high temperature /remains active during high temperature induced denaturation of double stranded DNA/ extension of primers	1 1	2
20.	(a) (i) - Inverted Pyramid of Biomass - Such pyramids are seen in- Aquatic Conditions where a small standing crop of phytoplanktons supports a large standing crop of zooplankton or fish / In terrestrial ecosystem – when a large number of insects are feeding on a single tree / or any correct other example (ii) -Ecological pyramids does not take into account the same species belonging to two or more trophic levels. -It does not accommodate a food web. -Saprophytes are not given any place in ecological pyramids even though they play a vital role in the ecosystem. (Any two)	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$	

	OR (b) (i) -Decline in plant production. -Lowered resistance to environmental perturbations as drought. -Increased variability in certain ecosystem processes such as water use and pest and disease cycles - Any other correct point (Any two points) (ii) -Habitat loss and fragmentation. -Alien species invasion. -Over exploitation -Co-extinction (Any two)	1/2+1/2 1/2+1/2 2							
21.	(a) Case 1 –Male heterogamety Organism – Many insects / grasshopper / any correct example. Case 2 –Female heterogamety Organism – Birds / hen / any correct example. OR (b) (i) <table><tr><td>DNA nucleotide</td><td>RNA nucleotide</td></tr><tr><td>Has deoxyribose sugar</td><td>Has Ribose sugar</td></tr><tr><td>Types of nitrogen bases are A,G,C,T</td><td>Types of nitrogen bases are A,G,C,U</td></tr></table> (Any one difference) (ii) Bonds in a nucleotide N – Glycosidic linkage (between Sugar and Base) Phosphoester linkage – (Between Sugar and Phosphate)	DNA nucleotide	RNA nucleotide	Has deoxyribose sugar	Has Ribose sugar	Types of nitrogen bases are A,G,C,T	Types of nitrogen bases are A,G,C,U	1/2 1/2 1/2 1/2 1 1/2 1/2 2	
DNA nucleotide	RNA nucleotide								
Has deoxyribose sugar	Has Ribose sugar								
Types of nitrogen bases are A,G,C,T	Types of nitrogen bases are A,G,C,U								
	SECTION C								
22.	(a) Cry I Ab (b)	1/2							

	The spores of Bt were mixed with water and sprayed in field A where these are eaten by the insect larvae, in the gut of the insect toxins are released, and insect get killed. (c) The genetically modified plants (GM) express Bt genes/ produces Bt toxin which when ingested will kill the pest.	$\frac{1}{2} \times 3$ 1	3
23.	(a) - No bands will be seen in agarose gel. - DNA fragments being negatively charged will not move towards negative end or cathode / DNA being negatively charged will remain positioned at anode or positive end. (b) - Position of positive terminal or anode and negative terminal or cathode has been interchanged. - Band at X being the smallest fragment of DNA move farthest towards the anode.	$\frac{1}{2}$ $\frac{1}{2}$ 1 1	3
24.	(a) Source plant - <i>Papaver somniferum</i> Part - latex of the plant (b) - Heroin is formed by acetylation of morphine. - Morphine → It is effective sedative/ used as pain killer/ useful in patient who have undergone surgery Heroin is a depressant / slows down body function	$\frac{1}{2}$ $\frac{1}{2}$ 1 $\frac{1}{2}$ $\frac{1}{2}$	3
25.	The diagram illustrates the process of oogenesis in a human female. On the left, a vertical timeline shows the 'Life Phase of Individual' with three stages: 'Fetal life' (chromosome number 46, 1/2 Mark), 'Birth Childhood Puberty' (chromosome number 23, 1/2 Mark), and 'Adult Reproductive life' (chromosome number 23, 1/2 Mark). On the right, a cell lineage tree shows the progression of oogenesis. It starts with a 2N cell, which undergoes 'Mitosis Differentiation' to become a 'Primary Oocyte' (1/2 Mark). The primary oocyte then undergoes '1st meiotic division (completed prior to ovulation)' to produce a 'Secondary Oocyte' and a 'First polar body'. The secondary oocyte further divides to produce an 'Ovum (Egg Cell) or ootid' (1/2 Mark) and a 'Second polar body'. The entire process is titled 'Oogenesis in human female'.	$\frac{1}{2} \times 6$	3
26.	(a) No	$\frac{1}{2}$	

	-In cereals or rice or wheat pollen grains loose viability within 30 minutes of their release , -In some members of Rosaceae or Leguminoseae or Solanaceae –they maintain viability for months , -or any other correct example (b) They are stored using Cryo-preservation techniques / In liquid nitrogen at – 196°C	1 1 $\frac{1}{2}$	3
27.	(a) • Pedigree analysis –It is analysis of traits or inheritance of traits in several generations of a family. • Importance : To trace the inheritance of a trait, abnormality or a disease. (b) (i) Autosomal- Recessive (ii) Sickle Cell Anaemia / Thalassemia / Phenylketonuria /Any other correct example.	1 $\frac{1}{2}+\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	3
28.	(a) According to Hardy Weinberg principle – Sum total of all the Allelic frequencies in a population = 1. Let there be two alleles A and a in the population. Let their frequencies be ‘p’ and ‘q’ respectively. $p + q = 1$ The frequency of AA will be p^2 because - the probability that an allele A with frequency ‘p’ would appear on both the chromosomes of a diploid individual will be product of probabilities i.e. p^2. Similarly frequency of ‘a’ will be q^2 , and Aa is $2pq$ Hence $p^2 + 2pq + q^2 = 1$ (b) Gene migration or Gene flow, Genetic drift, Mutation, Genetic Recombination, Natural selection (Any two factors)	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}+\frac{1}{2}$	3

	SECTION D		
29.	(a) Cross I – Genotypes TT and tt / TT and Tt / TT and TT Cross II – Genotypes Tt and Tt. OR (a) Monohybrid Cross (b) • Test Cross. • It is done to find the genotype of an organism showing dominant phenotype. (c) • It shows that tall trait is dominant over dwarf . • Genetic principle – Law of Dominance.	$\frac{1}{2}$ $\frac{1}{2}$ 1 1 1 $\frac{1}{2}$ $\frac{1}{2}$	4
30.	(a) -Competitive release. -A species whose distribution is restricted to small geographical area due to the presence of competitively superior species expands its distributional range when competing superior species is removed. OR (a) Gause's competitive exclusion principle, states that two closely related species cannot co-exist indefinitely and the competitively inferior one will be eliminated eventually. (b) In shallow south American lakes visiting flamingos and resident fishes compete for common food Zooplankton / any other correct example (c) • By "Resource partitioning" • They choose different times for feeding or different foraging patterns e.g. Five closely related species of warblers avoid competition and coexist due to behavioural differences in their foraging activities / any other correct example.	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ 1 1 1	4
	SECTION E		
31.	(a)(i) Megaspore mother cell	$\frac{1}{2}$	

	- Megaspore mother cell undergoes meiotic division forming four megaspores or tetrad -three megaspores degenerate and one remain functional . -Functional megaspore undergoes three sequential mitotic divisions without cell wall formation to form eight nuclei . -Three nuclei arranged at micropylar end and three at chalazal end and two at the centre. -After 8 nucleated stage cell walls are laid down to form seven celled and eight nucleate female gametophyte or embryo sac. (ii)  (Any four labelling) OR (b) Situation 1 – Contraceptive used –Condoms by male, Diaphragms or cervical caps or vaults by female. (any one) Mode of Action –creates barrier for meeting of sperm and ovum . Situation 2 – Award one mark if attempted Situation 3 – Contraceptive device –Pills having progestogen or progestogen – estrogen combination / IUDs within 72 hours of coitus. Mode of Action –Pills inhibit ovulation and implantation/Alter the quality of cervical mucus to prevent entry of sperms/ Cu ions from Cu IUD increase phagocytosis of sperms/ suppress sperm motility and	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2} \times 4$ $\frac{1}{2}$ 1 $\frac{1}{2}$ $\frac{1}{2}$	
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	fertilizing capacity/ Hormone Releasing IUDs make uterus unsuitable for implantation. (any one device with its correct mode of action) Situation 4 – Device –Vasectomy Mode of Action –Blocks sperm Transport. Situation 5 – Device –Tubectomy Mode of Action –Block gamete transport and prevent conception.	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	5
32.	(a)(i) <i>Plasmodium falciparum</i> (ii) - Female Anopheles Mosquito -Mosquito picks up gametocytes from the infected person. -Fertilization and development takes place in mosquito gut. -Sporozoites from gut migrate to salivary glands of mosquito. (iii) After entering the blood stream they enter liver, and then into red blood cells and reproduce asexually, RBCs rupture and a toxic substance haemozoin is released causing chills and high fever. (iv) -Avoiding stagnation of water in and around residential areas. -Regular cleaning of household coolers. -Use of mosquito nets. -Introduce fishes like Gambusia in ponds – they feed on mosquito larval. -Spraying insecticides in ditches of doors and windows to have wire mesh. -Any other preventive measures. (Any two) OR (b) (i) Bio fertilizers – Organisms that enrich the nutrient quality of soil. e.g. bacteria fungi and cyanobacteria. (ii) -Bacteria / <i>Rhizobium</i> / <i>Azotobacter</i> / <i>Azospirillum</i> <i>Rhizobium</i> forms symbiotic association with roots of leguminous plants and fix atmospheric nitrogen into organic forms to be used by the plant,	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2} \times 3$ $\frac{1}{2} \times 3$ $\frac{1}{2} + \frac{1}{2}$ 1 $\frac{1}{2}$ $\frac{1}{2}$	

	<i>Azotobacter</i> or <i>Azospirillum</i> fix atmospheric nitrogen while free living in the soil. (Award one mark for any one organism with its correct contribution) -Fungi /genus <i>Glomus</i> . Fungi breakdown organic matter to release nutrients, <i>Glomus</i> form mycorrhiza with roots of the plants . This association helps to absorb phosphorous from soil and pass to the plant, plants show resistance to root-borne pathogens, plants show tolerance to salinity and drought , There is increase in plant growth. (Any one) -Cyanobacteria / <i>Anabaena</i> / <i>Nostoc</i> / <i>Oscillatoria</i> Fix atmospheric Nitrogen , serve as important biofertilizers in paddy fields (Any one) (iii)-Bio fertilizers do not pollute our environment (soil, ground water). -They conserve the beneficial soil microbes. -Do not cause contamination and harm human health. (Any two)	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$	5
33.	(a) (i) -Maurice Wilkins and Rosalind franklin, – X- ray diffraction studies of DNA. -Erwin Chargaff ,– For a double stranded DNA the ratios between Adenine and Thymine and Guanine and Cytosine are constant and equal to one. (ii) The salient features of double helix structure of DNA are as follows : -It is made of two polynucleotide chains, in which backbone is constituted by sugar phosphate and the bases project inside. -The two chains have antiparallel polarity. -The bases in two stands are paired through hydrogen bonds forming base pairs(bp). Adenine form double hydrogen bond with thymine and Guanine form triple hydrogen bond with cytosine. -The two chains are coiled in a right handed fashion.The pitch of helix is 3.4 nm and 10b.p in each turn. Distance between base pair in a helix is approximately 0.34 nm . -The plane of one base pair stacks over the other in double helix. (Any three points)	$\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ 1x3	

	OR		
	(b)(i) Template strand 3' – TAC TGG CAT AAA AGA CAT CAC GGG CAT GAA GTC CGT AAT – 5' m – RNA 5' – AUG ACC GUA UUU UCU GUA GUG CCC GUA CUU CAG GCA UUA – 3'	1	
	(ii) (1) In a bacterium 5' – AUG ACC GUA UUU UCU GUA GUG CCC GUA CUU CAG GCA UUA – 3' (2) In humans 5' – mGppp AUG ACC UUU UCU GUG CCC CUU CAG GCA UUA – poly A tail 3'	1	
	(iii) It will have 10 amino acids .	1	5