

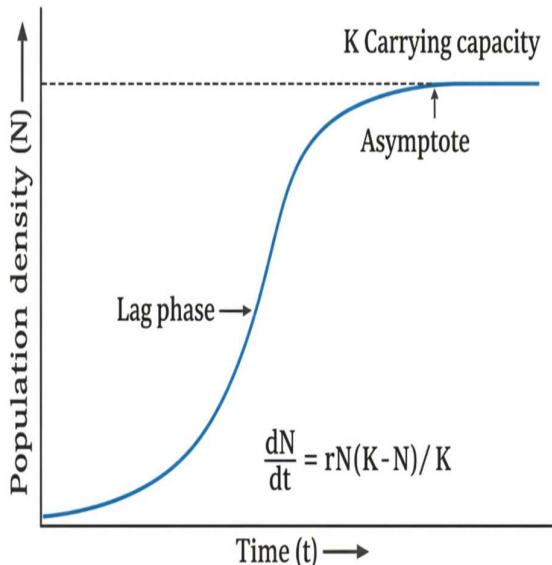
SOLUTIONS
Biology (Subject Code- 044)
(PAPER CODE: 57/3/2) (26-03-44N)

Q. No.	EXPECTED OUTCOMES/VALUE POINTS	Marks	Total Marks
	SECTION – A		
1.	(D) / Integuments	1	1
2.	(B) / Statements (i), (ii) and (iii) are correct	1	1
3.	(D) / Anthropogenic action	1	1
4.	(B) / Both statements I and II are true.	1	1
5.	(C) / <i>Vicia faba</i>	1	1
6.	(C) / Stratification	1	1
7.	(B) / Reduction of Vitamin A deficiency in humans	1	1
8.	(D) / B- Lymphocytes	1	1
9.	(C) / Fish	1	1
10.	(A) / a-iii, b-i, c-iv, d-ii	1	1
11.	(A) / (i), (ii), (iv) and (v) are correct	1	1
12.	(A) / Oral Pills	1	1
13.	(A) / Both Assertion (A) and Reason (R) are true and Reason (R) is correct explanation of the Assertion (A)	1	1
14.	(A) / Both Assertion (A) and Reason (R) are true and Reason (R) is correct explanation of the Assertion (A)	1	1
15.	(C) / Assertion (A) is true, but Reason (R) is false	1	1
16.	(C) / Assertion (A) is the true, but Reason (R) is false	1	1
	SECTION – B		
17.	(a) (i) Malaria <i>Plasmodium vivax</i> / <i>Plasmodium malariae</i> / <i>Plasmodium falciparum</i> (Any one) (ii) A toxin called hemozoin is released from ruptured RBC's that causes chill and fever recurring every three to four days.	$\frac{1}{2}$ $\frac{1}{2}$ 1	

	OR (b) <table border="1"> <tr> <th>Bioreactive molecules</th> <th>Microbial source</th> <th>Mode of action</th> </tr> <tr> <td>(i) <u>Cyclosporin A</u></td> <td><i>Trichoderma polysporum</i></td> <td>Immunosuppressive Agent in organ transplant</td> </tr> <tr> <td>(ii) <u>Streptokinase</u></td> <td><i>Streptococcus</i></td> <td>Clot buster / Removal of clots from the blood vessels</td> </tr> </table>	Bioreactive molecules	Microbial source	Mode of action	(i) <u>Cyclosporin A</u>	<i>Trichoderma polysporum</i>	Immunosuppressive Agent in organ transplant	(ii) <u>Streptokinase</u>	<i>Streptococcus</i>	Clot buster / Removal of clots from the blood vessels	$\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$	2
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18.	(a) (i) (I) Anode end is at S (II) Lightest/Smallest DNA is shown as R (ii) Agarose gel is made from a natural polymer extracted from sea weeds. Agarose gel provides sieving effect due to which DNA fragments separate according to their size. OR (b) (i) DNA fragments might not be stained or exposed to UV rays, They can be seen only after staining with ethidium bromide followed by exposure to UV radiation when DNA bands appear orange in colour. (ii) The desired DNA fragment is cut from the gel and extracted by elution	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 1	2									
19.	- Statistical analysis and Mathematical logic was applied to biology problems - Large sampling size that provided credibility to his data - His inferences from experiments on successive generations proved that his results pointed to general rules of inheritance rather than just ideas - Mendel studied characters in garden pea that were manifested in two opposing traits eg. Tall/dwarf round/wrinkled etc. (Any other relevant correct reasons)	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	2									
20.	(a) (i) - Brain size was 1400 cc - They used hides to protect their bodies - They buried their dead bodies (Any two)	$\frac{1}{2}$ $\frac{1}{2}$										

	(ii) (I) <i>Homo erectus</i> (II) <i>Homo habilis</i> OR (b) Given: (i) Frequency of blue-eyed individuals (bb) = 36% As per Hardy-Weinberg equilibrium if $q^2 = 0.36$ then $q = 0.6$ Acc. to Hardy-Weinberg equilibrium $(p + q) = 1$ Therefore $p = 1 - 0.6 = 0.4$ Frequency of allele B (p) = 0.4 (ii) Heterozygous individuals ($2pq$) $2pq = 2 \times 0.4 \times 0.6 = 0.48 = 48\%$ (iii) Homozygous dominant (p^2) $p^2 = (0.4) \times (0.4) = 0.16 = 16\%$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	2
21.	(a) ▪ Biopiracy ▪ Use of bioresources by multinational companies and other organisations without proper authorisation from the countries and people concerned without compensatory payment. (b) Indian Parliament has recently cleared the second amendment of Indian Patents Bill that considers patent terms emergency provisions, research and development initiatives.	$\frac{1}{2}$ $\frac{1}{2}$ 1	2
	SECTION -C		
22.	(a) Morgan hybridised yellow bodied white eyed females with brown bodied red eyed males and inter-crossed their progeny. (b) He observed that the two genes did not segregate independently of each other as in Mendelian inheritance pattern The ratio deviated from 9:3:3:1 ratio (expected when genes segregate independently) (c) ▪ Linkage - He gave this term to describe the physical association of the two genes present on the same chromosome.	1 1 $\frac{1}{2}$	

	Recombination - Generations of nonparental gene combinations.	$\frac{1}{2}$	3
23.	(a) <u>Steps in IVF</u> Ova from wife/donor female and sperms from husband/donor male, are collected and induced to form a zygote under simulated conditions, in a laboratory. The zygote or early embryos with up to 8 blastomeres could then be transferred in the fallopian tube (ZIFT) / embryos with more than 8 blastomeres could be transferred in the uterus (IUT) (b) No During IVF fertilization takes place in the lab (outside the female body)/ In this case fertilization takes place in female's body.	$\frac{1}{2} \times 3$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	3
24.	(a) - In some species (Asteraceae and grasses) the diploid egg cell is formed without reduction division and develop into an embryo without fertilization - Some of the nucellar cells surrounding the embryo sac starts dividing and protrude into the embryo sac and develop into an embryo (b) In Apomictic seeds there will be no segregation of the hybrid characters in the progeny plants so farmers can keep on using the hybrid seeds to raise new crop year after year/ If hybrid seeds are made apomictic the farmer need not to buy hybrid seeds every year hence, they are cost effective	1 1 1	3
25.	Diagram = $\frac{1}{2}$, Any correct labelling = $\frac{1}{2} \times 5$	$\frac{1}{2} + 2.5$	3
26.	(a) It is the process of polymerisation of amino acids to form a polypeptide as per the sequence coded in mRNA (b)	1	

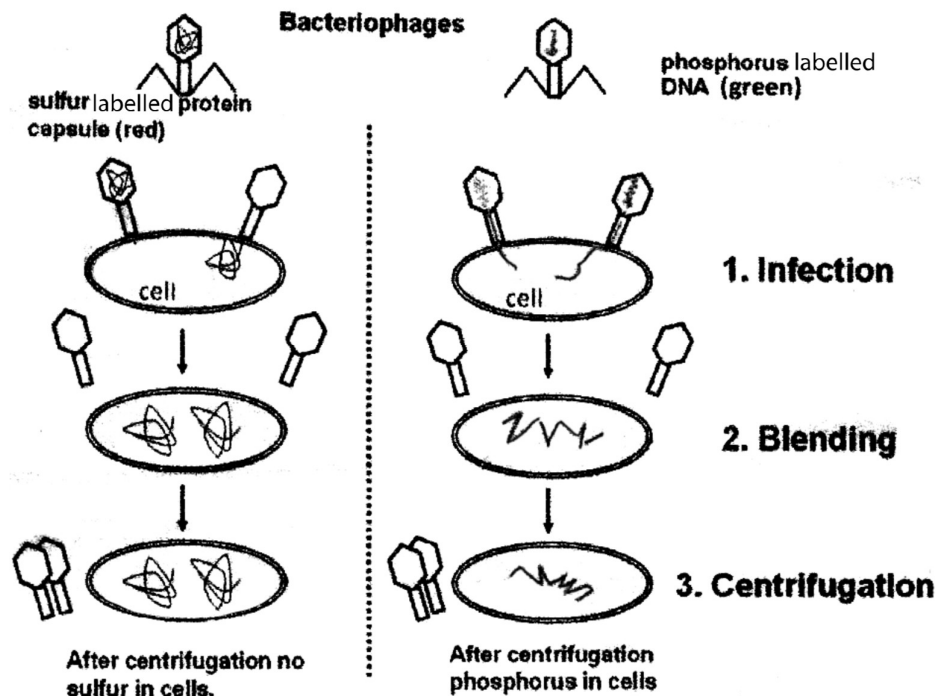
	Amino acids are activated in the presence of ATP and then linked to their corresponding cognate tRNA. Importance -The formation of peptide bond is favoured energetically.	1 1	3
27.	(a) - Alexander Fleming - He was culturing <i>Staphylococcus</i> bacteria in petri dishes. One day he found that a mould had grown in one of his unwashed culture plate and around that mould bacterial colonies were killed due to a chemical produced by the mould and he named it 'Penicillin' after the mould <i>Penicillium notatum</i>. (b) It is considered accidental as it was a chance discovery. (c) It marked the beginning of an antibiotic era and <i>Penicillin</i> was used to treat soldiers wounded in World War II.	1/2 1/2 1 1	3
28.	(a) Carrying capacity It denotes the limit of the maximum number of individuals of a species (population) that a habitat can support with the available resources. (b) Growth Curve is called Verhulst Pearl Logistic Growth A population growing in a habitat with limited resources shows a lag phase initially, it is followed by acceleration and deceleration and finally an asymptote. We get a Sigmoid Curve $\frac{dN}{dt} = rN \left(\frac{K-N}{K} \right)$ N= Population at time t r = Intrinsic rate of natural increase K= Carrying capacity //  Verhulst Pearl Logistic Growth Lag phase = 1/2, Asymptote = 1/2, K= 1/2, Equation = 1/2	1 1/2+1/2 1	3

	SECTION-D								
29.	(a) Wild life sanctuaries conserve highest number of species, In-situ conservation. (b) Zoological Parks and Botanical Gardens are different, They are ex-situ <table> <tr> <th>In situ Conservation</th> <th>Ex- Situ Conservation</th> </tr> <tr> <td>1) Conserves the whole ecosystem and biodiversity at all levels is protected.</td> <td>Conserves animals or plants that are endangered/threatened and given urgent measures to save them from extinction.</td> </tr> <tr> <td>2) Organisms are protected in their natural habitat.</td> <td>Organisms are taken out from their natural habitat and placed in special settings where they can be protected and given special care.</td> </tr> </table> (Any one difference) (Any other correct difference) (c) (i)High level of species richness, high degree of endemism OR (ii) ▪ In- situ Conservation. ▪ The tracts of forests were set aside and all trees and wild life within were venerated and given total protection.	In situ Conservation	Ex- Situ Conservation	1) Conserves the whole ecosystem and biodiversity at all levels is protected.	Conserves animals or plants that are endangered/threatened and given urgent measures to save them from extinction.	2) Organisms are protected in their natural habitat.	Organisms are taken out from their natural habitat and placed in special settings where they can be protected and given special care.	$\frac{1}{2}+\frac{1}{2}$ $\frac{1}{2}+\frac{1}{2}$ 1 $\frac{1}{2}+\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	4
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30.	(a) (i) Maximum / 45mg per cm³ at 10 minutes. OR (ii) Concentration of carbon monoxide increases and concentration of haem-bound oxygen decreases (b) Nicotine stimulates adrenal gland which releases adrenaline / nor adrenaline in blood resulting in increase of blood pressure and heart beat. (c) Nicotine is an Alkaloid Cocaine / coke /crack / morphine / cannabinoids.	1 $\frac{1}{2}+\frac{1}{2}$ 1 1 1	4						
	SECTION-E								
31.	(a) (i) ▪ The structure of bacteriophages consists of only DNA and protein ▪ Bacteriophage infects bacteria (E. coli) by inserting its genetic material. (ii) Radioactive phosphorous (³²P) as phosphorous is present only in DNA and not in proteins. Radioactive sulphur (³⁵S) as sulphur is present only in proteins not in DNA.	1 1 1							

(iii)

- Infection radioactive phage's were allowed to attach to E. coli bacteria
- Blending Viral coats were removed from the bacteria by blending
- Centrifugation virus particles were separated from bacteria by spinning them in a centrifuge

//



(iv) This established that DNA is Genetic material.

OR

(b) (i)

- When more than two alternative forms of a gene (alleles) exist for a particular trait in a population.
- In multiple alleles a gene has more than two alternative forms where as in simple dominant-recessive inheritance only two alleles are present.

(ii) Human trait ABO Blood Group,
having Alleles $I^A, I^B, I^O / i$

(iii)

Blood group Phenotype	Genotype
A	$I^A I^A$ or $I^A i$
B	$I^B I^B$ or $I^B i$
AB	$I^A I^B$
O	ii

$\frac{1}{2}$

$\frac{1}{2}$

$\frac{1}{2}$

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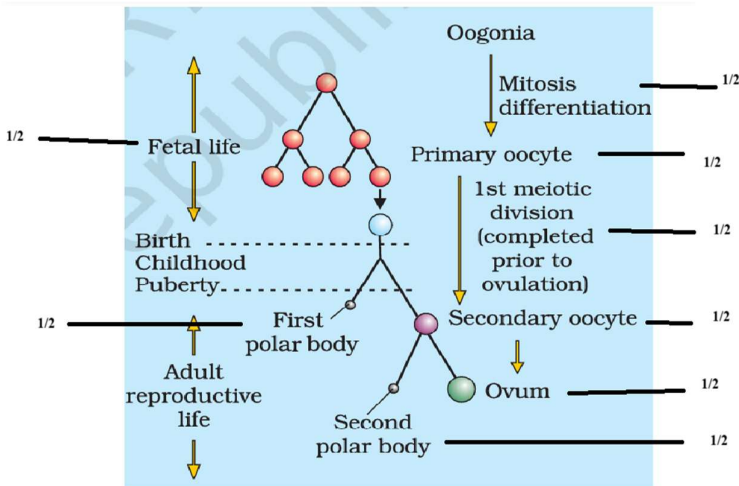
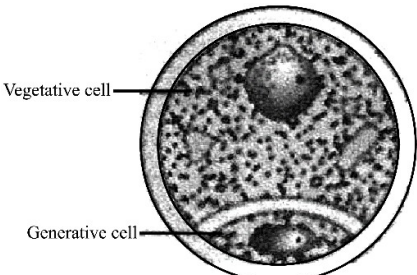
1

$\frac{1}{2}$

1

$\frac{1}{2}$

1

	(iv) It shows Co- Dominance as when both dominant alleles I^A and I^B are present they show as AB blood group/ I^A and I^B both express themselves this is called Co- dominance	1	5
32	(a) (i) ▪ Oogonia (gamete mother cells) $2n$ multiply by mitosis during foetal ovary and differentiate into primary oocytes, each primary oocyte gets surrounded by follicle cells to form a primary follicle. ▪ The primary oocyte remains arrested in prophase-I till puberty, after puberty oocyte inside the tertiary follicle completes meiosis-I to form a haploid secondary oocyte and a first polar body. ▪ Tertiary follicle changes into Graafian follicle. ▪ The secondary oocyte starts meiosis-II and then stops, Graafian follicle ruptures to release secondary oocyte (ovum) from the ovary (ovulation). //  The diagram illustrates the process of oogenesis. It starts with Oogonia, which undergo mitosis and differentiation to become Primary oocytes. This occurs during Fetal life. Primary oocytes remain arrested until Puberty. At Puberty, the first meiotic division is completed, resulting in a Secondary oocyte and a First polar body. The Secondary oocyte then undergoes the second meiotic division, which is arrested until Fertilization. At Fertilization, the second meiotic division is completed, resulting in an Ovum and a Second polar body. The diagram also shows the timeline of life stages: Fetal life, Birth, Childhood, Puberty, and Adult reproductive life. (ii) Luteinizing hormone (LH) and Follicle stimulating hormone (FSH) OR b) (i)  The diagram shows a cross-section of a cell. The Vegetative cell is the larger, outer layer, and the Generative cell is the smaller, inner layer. (ii) Three layers	$\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ 1 $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$	

	▪ A single stranded DNA or RNA tagged with radioactive molecule (probe) is created it binds to its complementary DNA in a clone of cells followed by detection using autoradiography, Clone having mutated gene will not appears on photographic film as it does not have complementarity.	$\frac{1}{2}$	5
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