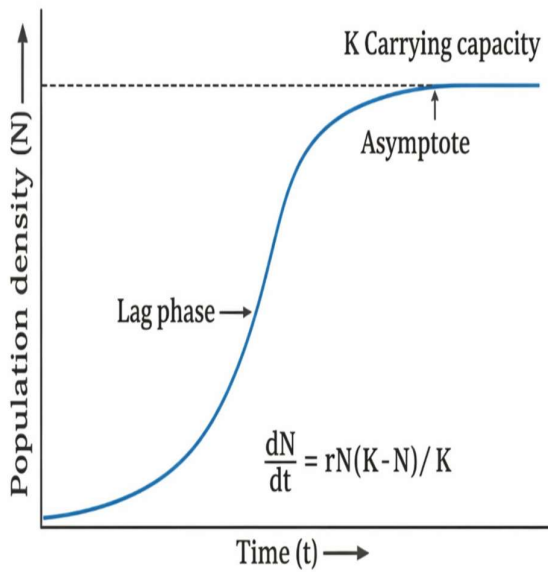


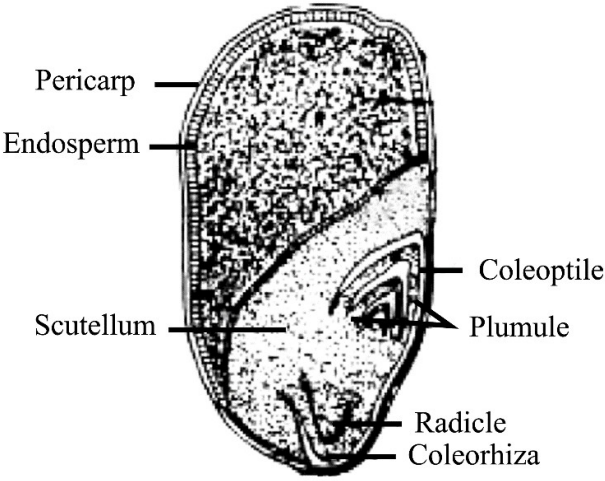
SOLUTIONS
Biology (Subject Code- 044)
(PAPER CODE: 57/3/1) (26-03-44N)

Q. No.	EXPECTED OUTCOMES/VALUE POINTS	Marks	Total Marks
SECTION – A			
1.	(D) / Oxytocin from maternal pituitary gland	1	1
2.	(C) / Stratification	1	1
3.	(A) / a-iii, b-i, c-iv, d-ii	1	1
4.	(B) / Reduction of Vitamin A deficiency in humans	1	1
5.	(C)	1	1
6.	(D) / Anthropogenic action	1	1
7.	(A) / (i), (ii), (iv) and (v) are correct	1	1
8.	(D) / Skin ulcers	1	1
9.	(A) / Standing crop	1	1
10.	(D) / Nucleotide	1	1
11.	(B) / Statements (i), (ii) and (iii) are correct	1	1
12.	(A) / <i>Vallisneria</i> and <i>Hydrilla</i>	1	1
13.	(C) / Assertion (A) is true, but Reason (R) is false	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.	(A) / Both Assertion (A) and Reason (R) are true and Reason (R) is correct explanation of the Assertion (A)	1	1
16.	(B) / Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A)	1	1
SECTION B			
17.	(a) (i) Ringworm (ii) <i>Epidermophyton</i> , <i>Trichophyton</i> , <i>Microsporum</i> (Any two) (iii) From soil/ using towels/ clothes/ comb of infected person (Any one) OR	$\frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2}$	

	(b) (i) Allergy (ii) Ig E antibodies (iii) Histamine, Serotonin (iv) Anti histamine, adrenaline, Steroids	(Any one) (Any one)	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	2
18.	(a) (i) - Brain size was 1400 cc - They used hides to protect their bodies - They buried their dead bodies (ii) (I) <i>Homo erectus</i> (II) <i>Homo habilis</i>	(Any two)	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	2
	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) $p^2 = (0.4) \times (0.4) = 0.16 = 16\%$		$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	2
19.	Henking traced a specific nuclear structure all through spermatogenesis in a few insects, and observed that 50 per cent of the sperm received a special structure after spermatogenesis, whereas the other 50 per cent sperm did not receive it. This observation later helped in sex determination as		$\frac{1}{2} + \frac{1}{2}$	

	⇒ eggs fertilised by a sperm having X chromosome developed into females. ⇒ Eggs fertilised by sperms not having X chromosome developed into males.	$\frac{1}{2}$ $\frac{1}{2}$	2
20.	(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
21.	(a) Genetic Engineering Approval Committee (b) ▪ To make decisions regarding validity of GM Research. ▪ Safety of introducing GM organisms for public services.	1 $\frac{1}{2}$ $\frac{1}{2}$	2
SECTION C			
22.	(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
23.	(a) It is the process of polymerisation of amino acids to form a polypeptide as per the sequence coded in mRNA	1	

	(b) 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
24.	(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 = $\frac{1}{2}$, Asymptote = $\frac{1}{2}$, K= $\frac{1}{2}$, Equation = $\frac{1}{2}$	1 $\frac{1}{2} + \frac{1}{2}$ 1	3

25.	(a) Steps in IVF 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.	$\frac{1}{2} \times 3$ $\frac{1}{2}$ $\frac{1}{2}$	3
26.	 (Diagram = $\frac{1}{2}$, Any correct labelling = $\frac{1}{2} \times 5$)	$\frac{1}{2} + 2.5$	3
27.	(a) Yes, there is no need of inoculum as the cow dung contains a lot of methanogens. (b) Inside the digester the biowaste is digested by anaerobic bacteria (methanogens) present in the cow dung. (c) Useful By-products - Biogas, used for cooking and lighting/ - Slurry, used as fertiliser / manure (Anyone with correct correlation- $\frac{1}{2}$ mark for name of byproduct and $\frac{1}{2}$ mark for its use)	$\frac{1}{2} + \frac{1}{2}$ 1 $\frac{1}{2} + \frac{1}{2}$	3

28.	(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. ▪ Recombination - Generations of nonparental gene combinations.	1	1	1/2	1/2	3						
SECTION D												
29.	(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	1/2+1/2	1	1	1	4					
30.	(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><td>In situ Conservation</td><td>Ex- Situ Conservation</td></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 relevant difference)	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.	1/2+1/2	1/2+1/2	1		
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	(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.	$\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$	4
	SECTION E		
31.	(a) (i) Griffith worked on <i>Streptococcus pneumoniae</i> bacteria having two strains: S strain (Smooth) with mucous (polysaccharide) coat was virulent/ pathogenic R strain (Rough) has no coat and was non virulent/non pathogenic Griffith took a Mice and injected these bacteria in a series of experiments S strain → Inject into Mice → Mice Died R strain → Inject into Mice → Mice live He killed S strain bacteria with heat S strain (heat killed) → Inject into Mice → Mice live S strain (heat killed) + R strain (live) → Inject into mice → Mice die He recovered living S bacteria from the body of dead mice. Conclusion: Griffith concluded that some “transforming principle” transferred from the heat-killed S strain, had enabled the R strain to synthesise a smooth polysaccharide coat and become virulent due to the transfer of the genetic material. (ii) MacLeod, MacCarty & Avery They worked to determine the biochemical nature of “transforming principle” in Griffith’s experiment. They purified biochemical (DNA, RNA, protein etc) from heat killed S cells to see which could transform live R cells into S cells. They discovered that DNA alone from S cells transformed R cells. They also discovered that protein digesting Proteases and RNA digesting RNases did not affect transformation.	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	

But when DNA was digested by DNase there was no transformation So DNA is hereditary material.

1/2

OR

(b)

(I)

Parents (P) : Normal female $\rightarrow XX$

Male Haemophilic $\rightarrow X^h Y$

Gametes: female $\rightarrow (X)(X)$ Male $\rightarrow (X^h)(Y)$

1/2

$\begin{smallmatrix} \text{♀} & \text{♂} \end{smallmatrix}$	X^h	Y
X	XX^h (Carrier Girl)	XY (Normal Boy)
X	XX^h (Carrier Girl)	XY (Normal Boy)

1/2

(II)

Parents (P) : Carrier Female $\rightarrow XX^h$

Normal male $\rightarrow XY$

Gametes : Female $\rightarrow (X)(X^h)$ Male $\rightarrow (X)(Y)$

1/2

$\begin{smallmatrix} \text{♀} & \text{♂} \end{smallmatrix}$	X	Y
X	XX (Normal Girl)	XY (Normal Boy)
X^h	XX^h (Carrier Girl)	X^hY (Haemophilic Boy)

1/2

(III)

	Parents (P) : Carrier female $\rightarrow XX^h$ Haemophilic Male $\rightarrow X^hY$ Gametes : Female $\rightarrow (X)(X^h)$ Male $\rightarrow (X^h)(Y)$ <table border="1"> <tr> <td>$\begin{smallmatrix} \text{♂} \\ \diagdown \\ \text{♀} \end{smallmatrix}$</td> <td>$X^h$</td> <td>$Y$</td> </tr> <tr> <td>$X$</td> <td>$XX^h$ (Carrier Girl)</td> <td>XY (Normal Boy)</td> </tr> <tr> <td>X^h</td> <td>X^hX^h (Haemophilic Girl)</td> <td>X^hY (Haemophilic Boy)</td> </tr> </table>	$\begin{smallmatrix} \text{♂} \\ \diagdown \\ \text{♀} \end{smallmatrix}$	X^h	Y	X	XX^h (Carrier Girl)	XY (Normal Boy)	X^h	X^hX^h (Haemophilic Girl)	X^hY (Haemophilic Boy)	$\frac{1}{2}$ $\frac{1}{2}$	
$\begin{smallmatrix} \text{♂} \\ \diagdown \\ \text{♀} \end{smallmatrix}$	X^h	Y										
X	XX^h (Carrier Girl)	XY (Normal Boy)										
X^h	X^hX^h (Haemophilic Girl)	X^hY (Haemophilic Boy)										
	(ii) Conclusions - Haemophilia is transmitted from unaffected carrier female to some of the male progeny/ The possibility of a female being haemophilic is extremely rare because mother of such a female has to be a carrier and father haemophilic which is not possible in the later stage of life. - Sex linked recessive disorder.	1 1	5									
32.	(a) (i) - Genetic Engineering Technique to alter the chemistry of genetic material (DNA and RNA) to introduce these into host organisms and thus change the phenotype of the host organism. - Bioprocess Engineering Maintenance of sterile ambience in chemical engineering process to enable growth of only the desired microbe/eukaryotic cell in large quantities for the manufacture of biotechnological/ biological products like antibiotics, vaccines, enzymes etc. (ii) - Restriction Enzymes (Molecular Scissors) Cut DNA at specific point on sugar phosphate backbone /They cut DNA at specific recognition sequences, called palindromes They create sticky ends	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$										

	(ii) Luteinizing hormone (LH) and Follicle stimulating hormone (FSH) 1/2+1/2 OR b) (i) (ii) Three layers ▪ Plasma membrane 1/2 ▪ Intine 1/2 ▪ Exine 1/2 (iii) ▪ Sporopollenin. 1 ▪ It is very resistant/ cannot be degraded by enzymes/ acids/ alkali/ temperature. 1/2 (iv) Outermost layer is disrupted at some places to form the germ pores through which pollen germinates to form pollen tube. 1	5	
	- o O o -		