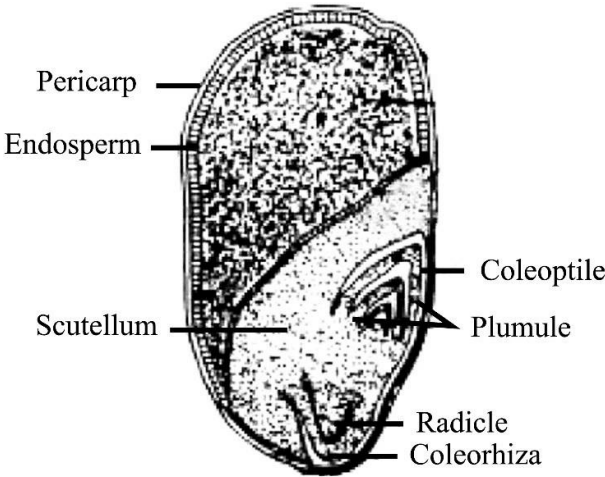
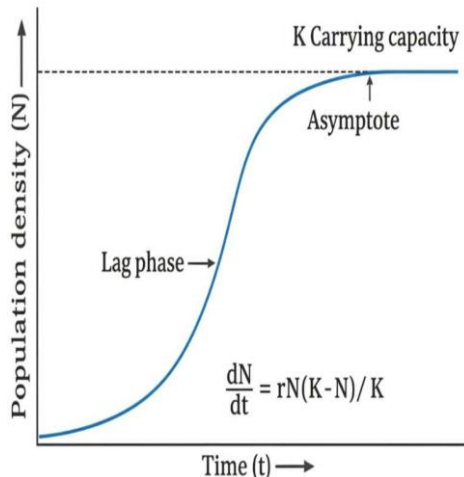


SOLUTIONS
Biology (Subject Code-044)
(PAPER CODE : 57/3/3) (26-03-44N)

Q.No.	EXPECTED OUTCOMES/VALUE POINTS	Marks	Total
	SECTION – A		
1.	(D) / (i) 3000 bases; (ii) 2.4 million bases	1	1
2.	(D) / Housefly	1	1
3.	(B) / It is the first enzyme isolated from strain S ₂ of bacterium	1	1
4.	(A) / <i>Vallisneria</i> and <i>Hydrilla</i>	1	1
5.	(B) / Statements (i), (ii) and (iii) are correct	1	1
6.	(B) / 50%	1	1
7.	(C)	1	1
8.	(D) / Oxytocin from maternal pituitary gland	1	1
9.	(D) / (a) – ii, (b) – i, (c) – iv, (d) – iii	1	1
10.	(C) / Split gene	1	1
11.	(B) / Reduction of Vitamin A deficiency in humans	1	1
12.	(D) / Skin ulcers	1	1
13.	(B) / Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A)	1	1
14.	(A) / Both Assertion (A) and Reason (R) are true and Reason is correct explanation for Assertion (A).	1	1
15.	(C) / Assertion (A) is true, but Reason (R) is false	1	1
16.	(A) / Both Assertion (A) and Reason (R) are true and Reason (R) is correct explanation of the Assertion (A)	1	1
	SECTION-B		
17.	(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.	½ ½ ½ ½	

	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.	$\frac{1}{2}$ $\frac{1}{2}$ 1	2
s18.	(a) (i) <i>Australopithecus</i> <i>Homo habilis</i> <i>Homo erectus</i> <i>Homo Neanderthalensis</i> (ii) (I) <i>Neanderthalensis</i> (II) <i>Australopithecus</i> (b) OR (i) Natural selection is a process in which individuals with traits better suited to their environment survive & reproduce and pass on those traits to next generation. (ii) ▪ Directional selection It favours selection of individuals at one extreme of a trait. It leads to a shift in particular direction. ▪ Eg. Development of antibiotic/ Resistance in bacteria/ Dark colouration of moth after industrialization. (Any one) // ▪ Disruptive selection; both extreme phenotypes are favoured over the intermediate. ▪ Eg. Beak size variations in finches or any other relevant example	1 $\frac{1}{2}$ $\frac{1}{2}$ 1 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	2
19.	(a) A – Meiosis B – Mitosis (b) Parthenogenesis (c) Haplodiploid Sex – determination	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	2
20.	(a) (i) Ringworm	$\frac{1}{2}$	

	(ii) <i>Epidermophyton, Trichophyton, Microsporum</i> (Any two) (iii) From soil/ using towels/ clothes/ comb of infected person (Any one) OR (b) (i) Allergy (ii) Ig E antibodies (iii) Histamine, Serotonin (Any one) (iv) Anti histamine, adrenaline, Steroids (Any one)	$\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	2
21.	(a) - ADA/ Adenosine Deaminase gene - Gene Therapy– A functional copy of the ADA gene is inserted into the isolated and cultured lymphocytes of the patient using a suitable vector like a retrovirus, the corrected cells are then reintroduced into the patient enabling the production of the ADA enzyme and restoring immune function, (b) As these lymphocytes are not immortal, the patient requires periodic infusion of such genetically engineered lymphocytes.	$\frac{1}{2}$ 1 $\frac{1}{2}$	2
	SECTION-C		
22.	 (Diagram= $\frac{1}{2}$, Any correct labelling = $\frac{1}{2} \times 5$)	3	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 are transferred in the uterus (IUT)	$\frac{1}{2} \times 3$ $\frac{1}{2}$	

	Case II- Active Immunity (vaccine stimulates body to produce its own antibodies) (b) <table><tr><td>Active immunity</td><td>Passive immunity</td></tr><tr><td>Body produces antibodies. / Long term protection.</td><td>Readymade antibodies given. / Immediate short term protection.</td></tr></table> (c) - It is a preparation of weakened or inactivated pathogens or their antigens - It stimulates the body immune system to produce antibodies and memory cells/ preparing the body to fight with the pathogen and provide immunity thus preventing a disease.	Active immunity	Passive immunity	Body produces antibodies. / Long term protection.	Readymade antibodies given. / Immediate short term protection.	½ 1 ½ ½	3
Active immunity	Passive immunity						
Body produces antibodies. / Long term protection.	Readymade antibodies given. / Immediate short term protection.						
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 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	1 ½+½ 1					

	Lag phase = ½, Asymptote = ½, K= ½, Equation = ½		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 ½+½ 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 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.	½+½ ½+½ 1 ½+½ ½+½	4
In situ Conservation	Ex- Situ Conservation								
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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.								
	SECTION-E								
31.	(a) (i) ▪ Genetic Engineering	½							

	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.	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	
	(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 ▪ Cloning vectors These are DNA molecules used to carry foreign genes into a host cell. ▪ Competent host These are living organisms in which recombinant DNA is introduced OR	$\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$	
	(b) (i) Urine analysis/ stool analysis/ sputum analysis/ Serum Analysis Disadvantages: Early detection not possible/ Detect the disease when it has spread/ shows symptoms (Any other method with its disadvantages)	1 1	
	(ii) Three molecular diagnostic techniques: ▪ Polymerase chain Reaction (PCR) Amplifies specific DNA sequences from very small samples. ▪ ELISA (Enzyme Linked Immuno Sorbent Assay) Based on antigen - antibody interaction infection by pathogen can be detected by the presence of antigen / by detecting the antibodies synthesised against the pathogen. ▪ 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.	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$	5

32.	<u>(a)</u> (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. But when DNA was digested by DNase there was no transformation So DNA is hereditary material. OR (b) (I)	½ ½ ½ ½ ½ ½ ½ ½ ½ ½	
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Parents (P) : Normal female $\rightarrow XX$
 Male Haemophilic $\rightarrow X^h Y$
 Gametes: female $\rightarrow (X)(X)$ Male $\rightarrow (X^h)(Y)$

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

$\frac{1}{2}$

$\frac{1}{2}$

(II)

Parents (P) : Carrier Female $\rightarrow XX^h$
 Normal male $\rightarrow XY$
 Gametes : Female $\rightarrow (X)(X^h)$ Male $\rightarrow (X)(Y)$

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

$\frac{1}{2}$

$\frac{1}{2}$

(III)

Parents (P) : Carrier female $\rightarrow XX^h$
 Haemophilic Male $\rightarrow X^hY$
 Gametes : Female $\rightarrow (X)(X^h)$ Male $\rightarrow (X^h)(Y)$

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

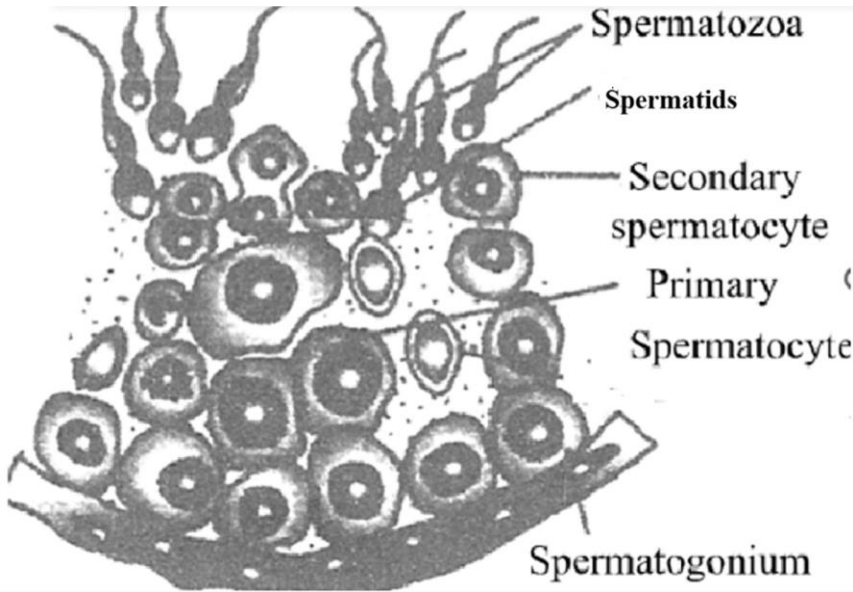
$\frac{1}{2}$

$\frac{1}{2}$

(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

1

	father haemophilic which is not possible in the later stage of life. Sex linked recessive disorder.	1	5
33.	(a) (i)  ($\frac{1}{2}$ -Diagram , 5 labels $\frac{1}{2} \times 5 = 2\frac{1}{2}$) (ii) - Hypothalamus Secretes gonadotropin releasing hormone (GnRH) which stimulates, anterior pituitary gland to secrete LH (Luteinizing hormone) and FSH (Follicle Stimulating hormone) - LH Stimulates Leydig cells → Causes the secretion of testosterone from the tests to stimulate Spermatogenesis. - FSH Stimulates Sertoli cells → Certain factors necessary for spermiogenesis OR (b) (i) Intentional or voluntary termination of pregnancy before full term is called MTP or induced abortion. (ii) - Risk of foetal abnormalities - Continuation of pregnancy could be harmful or even fatal either to the mother or to the foetus or both - In the case of rape or failure of contraceptive used (Any two) (iii) MTPs are considered relatively safe during the first trimester /upto 12 weeks of pregnancy.	3 $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 1 $\frac{1}{2} + \frac{1}{2}$ 1	

	(iv) Risk/ Concerns ▪ MTPs are being performed by unqualified quacks which are not only unsafe but could be fatal too for the mother. ▪ Misuse of amniocentesis to determine the sex of unborn child if the foetus is found to be female (female foeticide) it is followed by MTP.	1	
		1	5