SOLUTIONS
Biology (Subject Code-044)
(PAPER CODE : 57 / 5 / 1) (26-05-44N)

Q. No.	EXPECTED OUTCOMES / VALUE POINTS	Marks	TOTAL
	SECTION – A		
1.	(B) / P Q R S Thalamus Seed Endocarp Mesocarp	**1**	**1**
2.	(B) / oxytocin, maternal pituitary	**1**	**1**
3.	(B) / 64	**1**	**1**
4.	**(D)** / 100%	**1**	**1**
5.	**(D)** / Both (A) and (B)	**1**	**1**
6.	(C) / (ii), (iii), (i)	**1**	**1**
7.	(D) / Statins	**1**	**1**
8.	(D) / 5' C-T-G-C-A G 3' 3' G A-C-G-T-C 5'	**1**	**1**
9.	(B) / Sea anemone and clownfish.	**1**	**1**
10.	(C) / Foreign DNA is present in all of its cells.	**1**	**1**
11.	(D) / Thorns of *Bougainvillea* and Tendrils of *Cucurbita*.	**1**	**1**
12.	(C) / Nile perch	**1**	**1**
13.	(C) / Assertion **(A)** is true but Reason **(R)** is false.	**1**	**1**
14.	(B) / Both Assertion **(A)** & Reason **(R)** are true but Reason **(R)** is not the correct explanation of Assertion **(A)**	**1**	**1**
15.	(B) / Both Assertion **(A)** & Reason **(R)** are true but Reason **(R)** is not the correct explanation of Assertion **(A)**	**1**	**1**
16.	(A) / Both Assertion **(A)** and Reason **(R)** are true and Reason **(R)** is correct explanation of Assertion **(A)**	**1**	**1**
	SECTION-B		
17.	(a) (i) **Award marks if attempted.** (ii) It provides nourishment to the embryo. **OR** (b) Production of hybrid seed is very costly, If hybrid seeds are made into apomictic there is no segregation of characters of the hybrid progeny, farmers need not to buy	**1** **1** **1+1**	**2**

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	hybrid seeds every year, use of apomictic seeds would be cost effective, any other correct reason **(any two correct reasons)**		
18.	• Amniocentesis is test or procedure where some foetal cells in the amniotic fluid is analysed for certain genetic disorders. • Sex determination is done with the help of amniocentesis which may be misused for female foeticide / to legally check increasing menace of female foeticide.	**1** **1**	**2**
19.	• Spleen. • acts as a filter of the blood by trapping blood-borne microorganism.	**1** **1**	**2**
20.	(a) The meristem is removed from a diseased plant, and grown in-vitro / by tissue culture method plant produced is virus free. **OR** (b) – Treat the bacterial cells with a specific concentration of a divalent cation such as Ca^{++}. – Incubating bacteria (host) with recombinant DNA on ice. – Place them at 42^0C / give heat shock at 42^0C – Put them back on ice this enables the bacteria to take up the recombinant DNA.	**1+1** **½ x 4**	**2**
21.	(a)		

Grazing food chain	**Detritus food chain**
– Starts from producers.	– Starts from Detritus / decomposers / dead organic matter.
– It is the major conduit for energy flow in aquatic ecosystem	– It is the major conduit for energy flow in terrestrial ecosystem
– Less fraction of energy flow (because food chain is large)	– Larger fraction of energy flow (because food chain is smaller)

(any other relevant difference, **any two**) — **1x2**

OR

(b)

– It does not take into account the same species belonging to two or more trophic levels.
– It assumes a simple food chain something that almost never exists in nature
– 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) — **1 x 2** — **2**

SECTION-C

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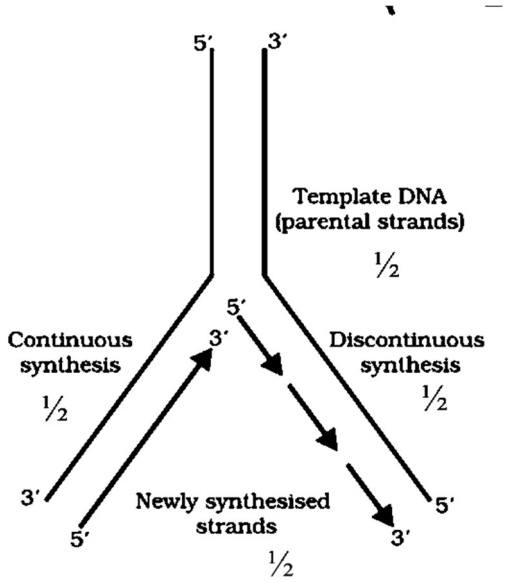
22.	– Self-incompatibility is the genetic mechanism which prevents self-pollination by inhibits the germination of pollen from same flower or different flower of same plant on stigma. – Unisexual **flowers** have no chance for self-pollination – Receptivity of male and female parts: Pollen release and stigma receptivity are not synchronised. – Position of male and female parts: The anther and stigma are placed at different positions so that the pollen cannot come in contact with the stigma of the same flower. – Unisexual **plants** have no chance of self-pollination. – Any other correct outbreeding device. **(Any three)**	**1x3**	**3**
23.	•  • Replication of DNA occurs in small replication fork because DNA being a long molecule separation of the two strands along its entire length requires a very high amount of energy.	**2** **1**	**3**
24.	(a) *Psilophyton* (b) Seed ferns (c) Chlorophyte ancestors (d) Ferns, Conifers, Seed ferns (e) Tracheophyte ancestors (f) Chlorophyte ancestors	½ ½ ½ ½ ½ ½	**3**
25.	(a) Beverages / Ethanol / Bakery products / Bread (b) Swiss Cheese (c) Citric acid (d) Cyclosporin-A / Immunosuppressive agent (e) Acetic acid (f) Streptokinase / Clot buster enzyme	½ ½ ½ ½ ½ ½	**3**

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26.	– **Normal physiology and development:** to study how genes are regulated / how genes affect normal body function and its development / study of complex factors involved in growth such as insulin-like growth factor. – **Study of disease:** to study how genes contribute to the development of a disease / model animals help us to study many diseases such as cancer or cystic fibrosis or rheumatoid arthritis or Alzheimer's / help us to investigate new treatment methods. – **Biological products:** To produce specific biological products / medicines / Medicines required to treat certain human diseases / produce human protein α-1-antitrypsin (which treat emphysema) / treatment of phenylketonuria / medicine required for the treatment of cystic fibrosis / produce human protein (alpha lactalbumin) rich milk by Rosie cow (it is nutritionally more balanced for human babies) – **Vaccine safety:** transgenic mice being developed for use in testing safety of vaccines before they are used on humans / Transgenic mice are being used to test the safety of the polio vaccine / after testing on transgenic animals is successful and found reliable they could replace use of monkeys to test the safety of batches of vaccine. – **Chemical safety testing:** Transgenic animals are made to carry genes which make them more sensitive to toxic substances than non-transgenic animals. They are then exposed to the toxic substances and the effects studied. **(Any three with correct explanation)**	**1 x 3**	**3**
27.	– Gause's competitive exclusion principle states that two closely related species competing for the same limited resources cannot co-exist indefinitely, and competitively inferior one will be eliminated eventually / If resources are limited the stronger competitor will dominate, driving the weaker one to extinction. – **Example**: In some shallow American lakes visiting flamingoes and resident fishes compete for their common food i.e. zooplankton in the lake / The Abingdon tortoise in Galapagos islands became extinct within a decade after the goats were introduced into the island probably due to the greater browsing efficiency of the goat or the feeding efficiency of one species (tortoise) is reduced by the interfering presence of the other species (goat) / any other correct example.	**1+1** **1**	**3**
28.	– **Genetic diversity** - It refers to the high diversity of a species at the genetic level over its distributional range, e.g. India has more than 50,000 genetically different strains of rice / The genetic variation shown by the medicinal plant *Rauwolfia vomitoria* growing in different Himalayan ranges might be in terms of the potency and concentration of the active chemical (reserpine) that the plant produces / India has about 1000 varieties of mango / any other correct example. – **Species diversity** - Diversity at species level / the number of different species in a given region, e.g. Western Ghats have a greater amphibian species diversity than Eastern Ghats / any other correct example. – **Ecological diversity** - Diversity at the ecosystem level / presence of different types of ecosystems in a particular area. e.g. India has a number of ecosystems like rain forests, coral reefs, deserts / any other correct example.	**½ + ½** **½ + ½** **½ + ½**	**3**

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	SECTION-D		
29.	(a) Because RNA polymerase carries out polymerisation in 5' → 3' direction only.	**1**	
	(b) (i) Since hnRNA contains both exons or coding sequence and introns or non coding seqeunce undergo splicing to remove the introns or non-coding sequence / for the removal of introns.	**1**	
	OR		
	(b) (ii).		
	- Capping / addition of $^{m}G_{ppp}$ (Methyl Guanosine Triphosphate) at 5' of hnRNA.	½	
	- Tailing / Adenylate residue (200-300) are added at the 3' end in a template strand as poly A tail.	½	
	(c)		
	– If a segment of DNA produces two polypeptides the genetic information machinery becomes complicated / two different polypeptides will be formed and one of which may not be useful for the cell.	**1**	
	– The two complementary RNA molecules produced simultaneously will form a double-stranded RNA that will not be translated into polypeptides.	**1**	
			4
30.	(a) Plasmids and bacteriophages have the ability to replicate / They multiply within the bacterial cells independently of the chromosomal DNA / an alien piece of DNA can be ligated to them / They can be multiplied equal to their specific copy numbers.	**1**	
	(b)(i) (I) ori (II) Pvu II	½+½	
	OR		
	(b) (ii) G : amp^{R} /ampicillin-resistance gene, H : $tet^{R/}$ tetracycline-resistance gene.	½+½	
	(c) Pst I , Pvu I, BamH I, Sal I	**½ X 4**	
			4
	SECTION-E		
31.	**(a)** • **Fertilisation** Fertilisation occurs in the ampulla / ampullary-isthmic junction of the fallopian tube, when sperm comes in contact with the ovum, it induces changes in the zona pellucida of the ovum that block the entry of additional sperms and thus ensures only one sperm, the secretions of the acrosome help the sperm to enter the cytoplasm of the ovum by dissolving the zona pellucida and plasma membrane, after the entry of sperm into the cytoplasm of ovum induces completion of meiosis II (of secondary oocyte), fusion occurs between the nucleus of ootid (ovum) and that of sperm to form a diploid zygote • **Implantation**: – The trophoblast layer gets attached to the endometrium.	**½ x 6**	

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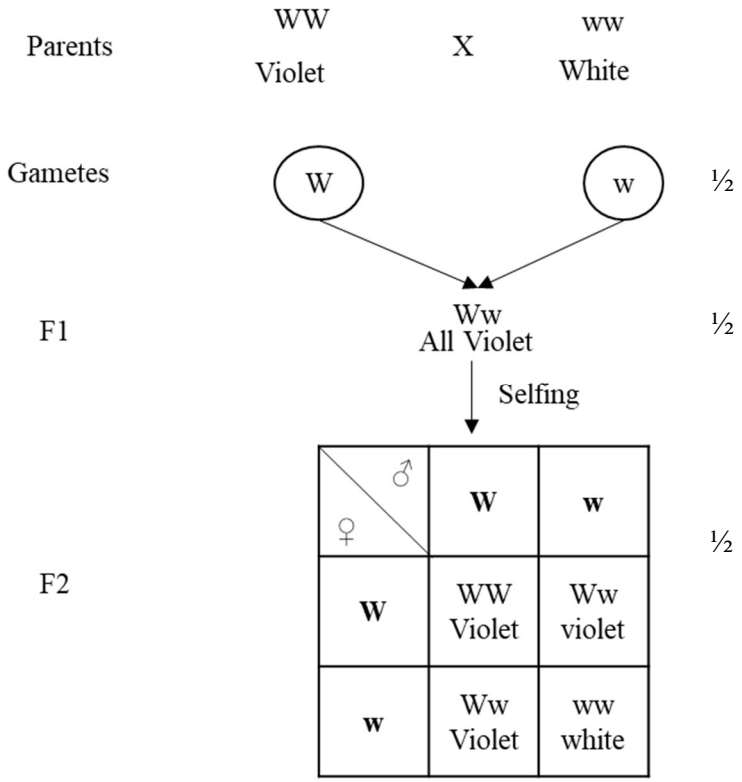
	– The uterine cells divide rapidly and cover the blastocyst as a result the blastocyst becomes embedded in the endometrium of uterus	**1x2**	
	OR		
	(b) (i)Hormones in sequence of their secretion in a pregnant woman. FSH; LH; hCG; Relaxin.	**1**	
	(ii) – **FSH**: Source: Anterior Pituitary. Function: Stimulates follicular development	**½ + ½**	
	– **LH**: Source: Anterior Pituitary. Function: It causes rupture of Graafian follicle and release of ovum into fallopian tube / Ovulation	**½ + ½**	
	– **hCG**: Source: Placenta. Function: It supports foetal growth, metabolic changes in mother and maintenance of pregnancy.	**½ + ½**	
	– **Relaxin**: Source: Ovary. Function: It facilitates parturition.	**½ + ½**	**5**
32.	(a) • **In Pea plants:**		



2½

Phenotypic ratio:- violet : white = 3 : 1 (½)

Conclusion: This is the case of dominance (½)

• **In *Antirrhinum* plant**

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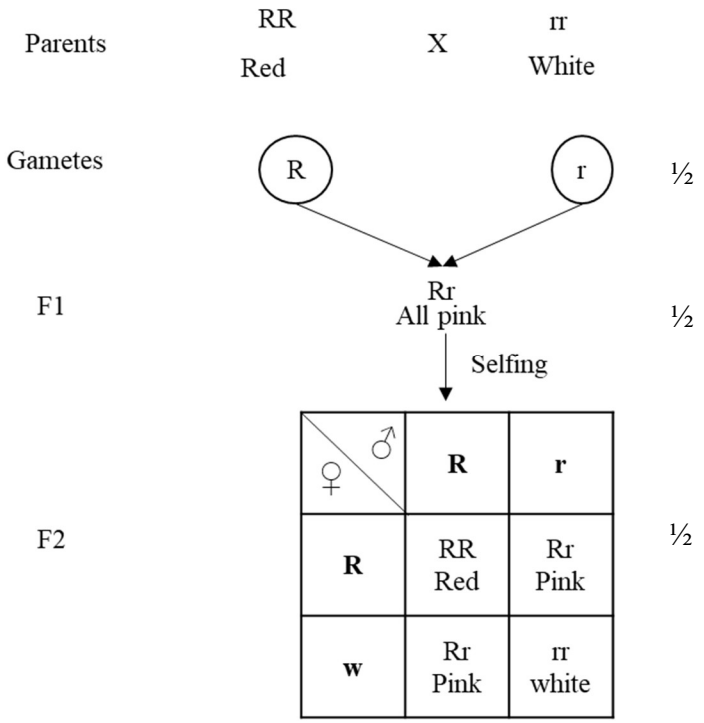

2½

Phenotypic ratio:- Red : Pink : white = 1 : 2 : 1 (½)

Conclusion: This is a case of incomplete dominance (½)

OR

(b) (i)

-

Mendelian disorder	Chromosomal disorder
– Occurs due to mutation / alteration in single gene / follow mendelian inheritance pattern	– Occurs due to addition or deletion of one or more chromosomes / Does not follow mendelian inheritance pattern

1

-

Example of mendelian disorder: Haemophilia / Cystic Fibrosis / Sickle Cell Anaemia / Colour Blindness / Phenylketonuria / Thalassemia / any other correct example. ½

Example of chromosomal disorder: Turner's syndrome / Down's syndrome / Klinefelter's syndrome / any other correct example. ½

(ii)

- Aneuploidy / Monosomy ½
- Turner's syndrome ½
- Symptoms:
  - lack of secondary sexual characters.
  - ovaries are rudimentary
  - sterile
  - short stature
  - underdeveloped feminine characters (any three)

  ½ x 3
- Karyotype – 44+XO (45) ½

5

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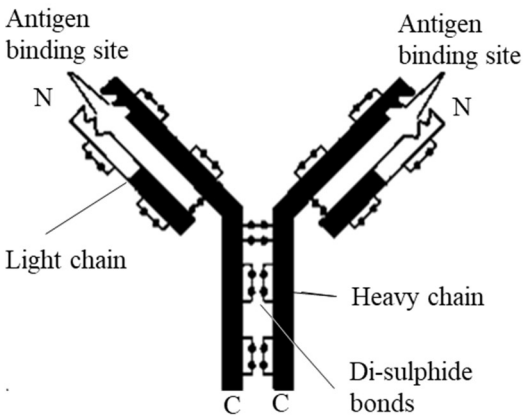
33. (a) (i)



(Any four labellings) — ½ x 4

(ii)

Active Immunity	Passive Immunity
– When antibodies are produced in our body in response to an antigen then it is called active immunity	– When preformed antibodies (readymade) are injected into the body for protection then it is called passive immunity.
– It is slow and take time to give its full effective response	– It gives quick response
– It lasts for longer period	– It lasts for shorter period
– Memory cells are formed	– Memory cells are not formed
	(any three correct difference)

1 x 3

OR

(b) (i)

(I) *Wuchereria bancrofti* , and *Wuchereria malayi* — ½+½

(II) Chronic inflammation of the organs / swelling in lower limbs / gross deformities in genital organs. — **1**

(III) Transmitted by the bite of female mosquito vector. — **1**

(ii)

(I) Mast cells, cause allergy — ½ + ½

(II) Virus infected cells, Protect the non-infected cells of our body from viral infections — ½ + ½

5

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