

## SUBJECTIVE TEST FOR XII

### BIOLOGY – SOLUTIONS

#### Section – A

1. c. pectinase and protease
2. c.  $\frac{1}{16}$
3. c. a–T, b–T, c–F, d–T
4. d. Tubectomy
5. d. DNA polymerase reads only in 5' → 3' direction
6. a. Both Assertion and Reason are true and the reason is the correct explanation of the assertion.
7. a. Both Assertion and Reason are true and the reason is the correct explanation of the assertion.

#### Section – B

8. a. Air borne  
b. *Salmonella typhi*  
c. Amoebiasis or Amoebic dysentery  
d. Dry and scaly lesions followed by intense itching.
9. i. GFC (grazing food chain)  
ii. 10% energy law-only about 10% energy transfers from one trophic level to the next.

OR

RNA transcript-5' AUGAUG–3'. Sequence of RNA is same as that of coding strand, except uracil in place of thymine.

10. i. Inverted pyramid of biomass where in small standing crop of phytoplankton supports large standing crop of zooplankton.  
ii. Pyramid of number is inverted in –Tree ecosystem  
Pyramid of biomass is inverted in – Pond ecosystem.
11. i. Denaturation, annealing, extension.  
ii. Amplification of desirable DNA.

OR

Active Immunity	Passive Immunity
It is developed when the person's own cells produce antibodies in response to infection or vaccine	It is developed when antibodies produced in other organisms are injected into a person to counter act antigen.
It provides relief after some time.	It provides immediate relief.
It has no side effects.	It may cause reaction
It is long lasting.	It is not long lasting
e.g. immunity developed due to repeated subclinical infections or due to vaccines which contain live or killed microorganisms.	e.g. immunity transferred from mother to foetus through placenta or use of anti tetanus serum.

## Section – C

12. i. **Synergids** – filiform apparatus present at micropylar part of the synergids guide the entry of pollen tube.
- ii. **Central cell** – Participate in double fertilisation and after triple fusion becomes the primary endosperm cell (PEC) and develops into the endosperm
- iii. **Egg cell** – Fuses with one of the male gametes resulting in formation of a diploid cell, the zygote
13. i. Blood group of offspring 1 shows two possibilities -
- (a) Blood group B– with genotype  $I^B i$
- (b) Blood group A– with genotype  $I^A i$
- ii. Blood group of offspring 2 shows two possibilities
- (a) Blood group O– with genotype  $ii$
- (b) Blood group A– with genotype  $I^A i$
- iii. Multiple alleles - there are more than two alternative forms of same gene at same locus in a population. example ABO blood group has 3 alleles  $I^A, I^B, i$  in a population.

### OR

- i. Death rate (d) It is expressed as decrease in number because of death with respect to total number of individuals in the population.
- for example. If 80 fruitflies dies in a population of 800 fruitflies in one week, then death rate is
- $$\Rightarrow d = \frac{80}{800} = 0.1 \text{ individual per fruitfly per week}$$
- (ii) birth rate, sex ratio
14. i. Reduction in fertility and productivity due to continuous inbreeding.
- ii. Hisardale
- iii. Herd improvement in short duration.
15. IUDs are intrauterine contraceptive devices, which are inserted into uterus by a doctor or nurse.
- These are
- i. Non - medicated IUDs e.g. **Lippes loop**.
- ii. Copper releasing IUDs e.g. **CuT, Multiload 375; Cu 7**.
- iii. Hormone releasing IUDs e.g. **Progestasert, LNG -20**.
- IUDs increase phagocytosis of sperms within the uterus and Cu ions released by some suppress sperm motility and the fertilising capacity of the sperms. The hormone releasing IUDs make the uterus unsuitable for implantation and cervix hostile to the sperms.

### OR

- i. hCG, hPL
- ii. Signals for parturition originate from fully formed foetus & placenta inducing mild uterine contractions (**labour pains**) called **foetal ejection reflex**.
- iii. Oxytocin

## Section – D

**Question 16 and 17 are Case Study Based Question. Each question has an internal choice and carries four (4) marks each.**

16. i. (a) haploid and corresponds to ootid  
ii. (b) zona pellucida  
iii. (a) after the entry of sperm in ovum but before the completion of fertilization  
iv. (b)  $2^\circ$  oocyte –  $22 + X$

**OR**

(a) Oviduct

17. i. (a) Humboldt                      ii. (a)  $\log S = \log C + Z \log A$   
iii. (b) 1.15                          iv. (c) rectangular hyperbola

**OR**

- i. Hydrophilly (Epihydrophilly)  
ii. No  
iii. No. It is quite rare, limited to around 30 genera  
iv. (a) Stigma are long  
(b) Pollen grains long, ribbon like and coated by a mucilaginous covering  
(c) Flower are odourless, colourless, nectar less

## Section – E

### 18. Goals of HGP (Any Four)

- (a) Identify all the approximately 20,000-25,000 genes in human DNA.
- (b) Determine the sequences of the 3 billion chemical base pairs that make up human DNA.
- (c) Store this information in databases.
- (d) Improve tools for data analysis.
- (e) Transfer related technologies to other sectors, such as industries.
- (f) Address the ethical, legal, and social issues (ELSI) that may arise from the project.

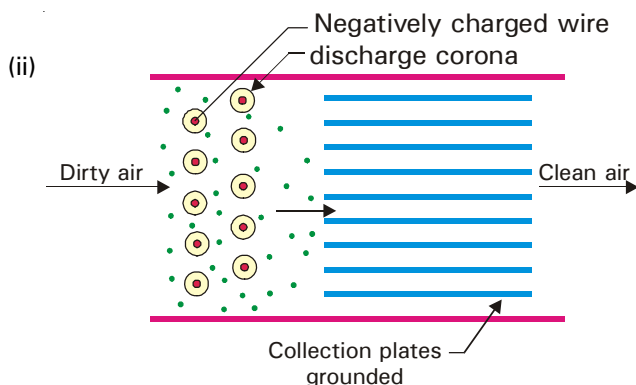
### Salient Features of HGP (Any Six)

- (a) The human genome contains 3164.7 million nucleotide bases.
- (b) The average gene consists of 3000 bases, but sizes vary greatly, with the largest known human gene being dystrophin at 2.4 million bases.
- (c) The total number of genes is estimated at 30,000—much lower than previous estimates of 80,000 to 1,40,000 genes. Almost all (99.9 per cent) nucleotide bases are exactly the same in all people.
- (d) The functions are unknown for over 50 per cent of discovered genes.
- (e) Less than 2 per cent of genome codes for proteins.
- (f) Repeated sequences make up very large portion of the human genome.
- (g) Repetitive sequences are stretches of DNA sequences that are repeated many times, sometimes hundred to thousand times. They are thought to have no direct coding functions, but they shed light on chromosome structure, dynamics and evolution.
- (h) Chromosome 1 has most genes (2968), and the Y has the fewest (231).

- (i) Scientists have identified about 1.4 million locations where singlebase DNA differences (**SNPs**—**single nucleotide polymorphism**, pronounced as 'snips') occur in humans.

OR

- (i) The Air (Prevention and Control of Pollution) Act in India came into force in 1981



The most widely used arrester is ESP which can remove over 99 per cent particulate matter present in the exhaust from a thermal power plant. It has electrode wires that are maintained at several thousand volts, which produce a corona that releases electrons. These electrons attach to dust particles giving them a net negative charge. The collecting plates are grounded and attract the charged dust particles. The velocity of air between the plates must be low enough to allow the dust to fall.

- (iii) According to Central Pollution Control Board (CPCB), particulate size 2.5 micrometers or less than 2.5 micrometer are responsible for causing the greatest harm to human health.

19. Gel electrophoresis is used for separation and isolation of DNA fragments on the basis of size of DNA. In Agarose gel electrophoresis, the most commonly used matrix is agarose (natural polymer extracted from sea weeds). Gel matrix is prepared. Pore size of gel matrix depends on agarose concentration. Since DNA fragments are negatively charged molecules they move towards the anode under an electric field through a medium/matrix. The DNA fragments separate (resolve) according to their size through sieving effect provided by the agarose gel. Smaller the fragment size, the farther it moves. The separated DNA fragments can be visualised only after staining with ethidium bromide followed by exposure to UV radiation.

Bright orange coloured bands of DNA in a ethidium bromide stained gel exposed to UV light are observed. Separated bands of DNA are cut out from agarose gel & extracted from gel piece. This step is known as **elution**.

Non observation of DNA bands on agarose gel can be due to

- Non-use of UV radiation.
- Contamination with nucleases leading to degradation of DNA.
- Wrong fitting of electrodes.
- Absence of or insufficient concentration of ethidium bromide.

OR

### Advantages of GM plants :

- Crops become more tolerant to **abiotic stresses** (cold, drought, salt, heat).
- It has **reduced reliance on chemical pesticides** (pest-resistant crops).
- Post harvest losses** have been reduced.
- It increases efficiency of **mineral usage** of by plants (this prevents early exhaustion of fertility of soil).
- Nutritional value** of food is enhanced. e.g., Vitamin 'A' enriched rice.

- vi. Used to create tailor-made plants to supply alternative **resources to industries**, in the form of starches, fuels and pharmaceuticals.
- vii. Brings herbicide resistance and **disease resistance** among plants, e.g., plants resistant to herbicides glyphosate and glufosinate have been developed.
- viii. GMO helps to clean up heavy metal pollution from contaminated soil by **phytoremediation**.
- ix. **Higher yield** through genetic modification.

#### **Disadvantage of GM food :**

- i. The transgene product may cause toxicity and / or produce **allergies**. The enzyme produced by the antibiotic resistance gene could cause allergies.
- ii. The bacteria present in the alimentary canal of the humans could take up the **antibiotic resistance** gene that is present in the GM food. These bacteria would then become resistant to the concerned antibiotic and difficult to manage.
- iii. It may cause **unintended harm** to other organisms. for e.g. pollen from Bt corn cause high mortality in monarch butterfly.
- iv. If gene is transferred to non - target species like weeds, they will become **superweeds**.
- v. It can disturb genetic setup of organisms and cause ecological imbalance and **genetic pollution**.

#### 20. i **Menstrual Phase**

First day of cycle is 1st day of menstrual phase. It lasts for 3-5 days. Progesterone level declines as corpus luteum degenerates. Endometrium & its blood vessels breakdown forming fluid which flows out through vagina along with unfertilized ovum, blood & mucus. About 50-100 ml of fluid alongwith mucus (blood -40 ml) is discharged through vaginal orifice during this phase. Menstrual flow has no clots.

#### **Follicular Phase**

Also called post-menstrual or pre-ovulatory phase. It lasts for 9-11 days. Gradually increasing FSH and LH levels stimulate few follicles to grow in the ovary and produce estrogen. One follicle matures into Graafian follicle while others undergo atresia. Endometrium of uterus regenerates through proliferation under influence of estrogen. Cervical mucus is thin.

#### **Ovulatory phase**

LH peak (6-10 times) in middle of cycle (14th day). LH surge causes radial elongation of coronal cell, separation of follicular cells from coronal cells and release of oocyte from the ovary. FSH also attains a peak (2-3 times). Graafian follicle is ruptured to release ovum(secondary oocyte).

#### **Luteal phase**

Also called pre-menstrual or post-ovulatory phase. It lasts for 12-14 days. Remaining part of Graafian follicle transforms into corpus luteum. Corpus luteum produces large amount of progesterone which is essential for maintenance of endometrium for implantation of fertilized egg. Uterine glands become secretory. Cervical mucus thickens. In absence of fertilization, corpus luteum will degenerate starting a new cycle.

- ii. Luteal phase
- iii. Luteal phase

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