

KEY ANSWERS

1	A	16	D	31	B	46	B
2	D	17	C	32	B	47	D
3	B	18	D	33	D	48	D
4	D	19	D	34	C	49	A
5	B	20	B	35	D	50	C
6	B	21	D	36	B	51	B
7	A	22	B	37	C	52	B
8	C	23	C	38	C	53	B
9	A	24	D	39	A	54	C
10	C	25	A	40	C	55	D
11	D	26	C	41	C	56	B
12	C	27	D	42	C	57	A
13	C	28	A	43	B	58	D
14	D	29	B	44	D	59	C
15	B	30	B	45	D	60	A

1. Which of the following statements is correct?

- (A) Female carrier for haemophilia may transmit the disease to sons.
 (B) Thalassaemia is a qualitative problem.
 (C) Change in whole set of chromosomes is called aneuploidy.
 (D) Sickle cell anaemia is a quantitative problem.

Ans. (A)

Solution: Sons always receive X chromosome from from mother. If female is a carrier XX^h , in which she may transmit X^h to son, Son will get haemophilia X^hY

-Thalassaemia is a quantitative problem as amount of haemoglobin produced decreases

-Change in whole set of chromosome is polyploidy

Sickle cell anemia is a qualitative problem where codon GAG changes to GUG

2. 'Gene-mapping' technology was developed by

- (A) Mendel (B) Tschermak (C) Correns (D) Sturtvent **Ans. (D)**

Solution: Alfred sturtavant using recombination frequency plotted first genetic map for Drosophila

3. Find the correct statement.

- (1) Generally a gene regulates a trait, but sometimes one gene has effect on multiple traits.
 (2) The trait AB-blood group of man is regulated by one dominant allele and another recessive allele.
 Hence it is co-dominant.

- (A) Both the Statements are wrong. (B) Statement (1) is correct.
 (C) Statement (2) is correct. (D) Both Statements (1) and (2) are correct. **Ans. (B)**

Solution: Gene regulates a trait, If one gene controls more than one trait its pleiotropism

AB blood group is due to $I^A I^B$ dominant alleles

4. From the following table, select the option that correctly characterizes various phases of menstrual cycle:

Menstruation phase	Follicular phase	Luteal phase
(A) Regeneration of endometrium	High level of progesterone	Developing corpus luteum
(B) Matured follicle	Regression of corpus luteum	Ovulation
(C) Menses	Developing corpus luteum	Follicle maturation
(D) Menses	L.H. Surge	Regeneration of endometrium

Ans. (D)

Solution: Menstrual phase is characterised by breakdown of endometrium leading to menstrual bleeding called menses

Follicular phase is characterised by growth of follicles leading to ovulation due to LH surge

Luteal phase is characterised by formation of corpus luteum which secretes progesterone which brings about regeneration of endometrium

5. Which of the following is abbreviated as ZIFT?
 (A) Zygote Inter Fallopian Tube (B) Zygote Intra Fallopian Transfer
 (C) Zygote Inter Fallopian Transfer (D) Zygote Intra Fallopian Tube **Ans. (B)**
6. An example for hormone releasing IUD is
 (A) Implant (B) LNG - 20 (C) Multiload 375 (D) Lippes loop **Ans. (B)**
Solution: LNG-20, Progestasert
7. MTPs are considered relatively safe during
 (A) First trimester (B) Second trimester
 (C) 24 weeks of pregnancy (D) 180 days of pregnancy **Ans. (A)**
Solution: MTP is safe in first trimester
8. The Lac-Operon model was elucidated by
 (A) Jacob and Crick (B) Watson and Crick
 (C) Francois Jacob and Jaques Monad (D) Hershey and Chase **Ans. (C)**
Solution: Jacob and Monod in 1969 elucidated Lac operon model in E.coli
9. Which of these is NOT an example for Adaptive radiation?
 (A) Long-necked Giraffe (B) Darwin's finches
 (C) Australian marsupials (D) Placental mammals **Ans. (A)**
Solution: Long necked giraffe is an example of Evolution due to use of organs, Concept of Lamarckism
10. In a population of 800 rabbits showing Hardy-Weinberg equilibrium, the frequency of recessive individuals was 0.16. What is the frequency of heterozygous individuals?
 (A) 0.36 (B) 0.4 (C) 0.48 (D) ± 81 **Ans. (C)**
Solution: $q^2 = 0.16$, so $q = 0.4$
 $p+q=1$
 $p=1-0.4=0.6$
 Frequency of heterozygous individuals = $2pq$ i.e. $2 \times 0.6 \times 0.4 = 0.48$
11. In male heterogametic type of sex determination
 (A) Males do not produce gametes.
 (B) Male parent produces similar gametes.
 (C) Female parent produces dissimilar gametes.
 (D) Male parent produces dissimilar gametes. **Ans. (D)**
Solution: Male heterogamety is seen in grasshopper(XO), humans, Drosophila (XY) where they produce 2 types of gametes.
12. In one of the hybridisation experiments, a homozygous dominant parent and a homozygous recessive parent are crossed for a trait. (Plant shows Mendelian inheritance pattern)
 (A) Dominant parent trait appears in F_2 generation and recessive parent trait appears only in F_1 generation.
 (B) Dominant parent trait appears in F_1 generation and recessive parent trait appears in F_2 generation.
 (C) Dominant parent trait appears in both F_1 & F_2 generations, recessive parent trait appears in only F_2 generation.
 (D) Dominant parent trait appears in F_1 generation and recessive parent trait appears in F_1 and F_2 generations. **Ans. (C)**
Solution: If Homozygous tall (TT) is crossed with homozygous dwarf (tt) F_1 would be heterozygous tall (Tt).
 F_2 would be 3 tall: 1 dwarf.
13. Histone proteins are positively charged because they are rich in basic amino acid residues
 (A) Arginine and Proline (B) Arginine and Alanine
 (C) Arginine and Lysine (D) Arginine and Phenylalanine **Ans. (C)**
Solution: Histone proteins are positively charged due to presence of basic amino acids Lysine and Arginine

14. Eukaryotic genes are monocistronic but they are split genes because
 (A) Introns are interrupted with Mutons. (B) they contain Exons only.
 (C) they contain Introns only. (D) Exons are interrupted by Introns. **Ans. (D)**
Solution: In Eukaryotes hn RNA formed will be having coding sequences Exons interrupted by non coding sequences introns, where splicing removes introns and joins exons.
15. Identify from the following a pair of better yielding semi dwarf varieties of rice developed in India.
 (A) Kalyan Sona and Sonalika (B) Jaya and Ratna
 (C) Sonalika and Ratna (D) Jaya and Kalyan Sona **Ans. (B)**
Solution: Sonalika and kalyansona are wheat varieties, Jaya and Ratna are rice varieties
16. In MoET technique fertilized eggs are transferred into surrogate mother in which of the following stage?
 (A) 16-32 celled stage (B) 2-4 celled stage (C) 8-16 celled stage (D) 8-32 celled stage **Ans. (D)**
Solution: In MOET from superovulated cows, fertilised eggs are transferred to surrogate mother in 8-32 celled stage
17. Roquefort cheese is ripened by
 (A) Yeast (B) Bacterium (C) Fungi (D) Virus **Ans. (C)**
Solution: Penicilliumroqueforti fungus is used in ripening
18. Four students were assigned a science project to find out the pollution levels of lakes in their surrounding. After analysing the quality of water samples, the BOD values were found as follows
 Which among the following water samples is highly polluted?
 (A) 0.16 mg/L (B) 0.6 mg/L (C) 0.06 mg/L (D) 6 mg/L **Ans. (D)**
Solution: More the BOD value more will be the polluting potential
19. The toxic substance 'haemozoin' responsible for high fever and chill, is released in which of the following diseases?
 (A) Typhoid (B) Dengue (C) Pneumonia (D) Malaria **Ans. (D)**
Solution: Ruptured RBC releases Haemozoin in Malaria causing chill and fever
20. Identify the symptoms of pneumonia.
 (A) High fever, weakness, stomach pain, loss of appetite
 (B) Difficulty in breathing, fever, chills, cough, headache
 (C) Nasal congestion and discharge, cough, sore throat, headache
 (D) Constipation, Abdominal pain, cramps, blood clots **Ans. (B)**
Solution: In Pneumonia lung alveoli gets filled with fluid leading to breathin difficulty, fever, chills, cough, headache
21. The variety of Okra, *Pusa Sawani* is resistant to which of the following insect pests?
 (A) Cereal leaf beetle (B) Aphids (C) Jassids (D) Shoot & Fruit borer **Ans. (D)**
22. With respect to Inbreeding, which among the following is not true?
 (A) It helps to evolve a pure line in an animal.
 (B) Inbreeding decreases homozygosity.
 (C) It helps in accumulation of superior genes.
 (D) It helps in elimination of less desirable genes. **Ans. (B)**
Solution: Inbreeding increases homozygosity
23. Generally, bears avoid winter by undergoing
 (A) Migration (B) Diapause (C) Hibernation (D) Aestivation **Ans. (C)**
Solution: winter sleep-Hibernation

24. Match Column-I with Column-II. Select the option with correct combination.

Column-I	Column-II
Standing state	p. Mass of living material at a given time.
Pioneer species	q. Amount of nutrients in the soil at a given time.
Detritivores	r. Species that invade a bare area.
Standing crop	s. Breakdown detritus into smaller particles.

A) 1-p, 2-s, 3-r, 4-q B) 1-q, 2-r, 3-p, 4-s C) 1-p, 2-r, 3-s, 4-q D) 1-q, 2-r, 3-s, 4-p **Ans. (D)**

25. PCR is used for

A) DNA amplification (B) DNA isolation (C) DNA ligation (D) DNA digestion **Ans. (A)**

Solution: Polymerase chain reaction is done to amplify gene of interest

26. Which of these is NOT a method to make host cells 'competent' to take up DNA?

(A) Use of disarmed pathogen vectors (B) Micro-injection
(C) Elution (D) Biolistics **Ans. (C)**

Solution: Elution is extracting gene from gel during gel electrophoresis

27. Select the correct statement from the following:

- (A) DNA from one organism will not band to DNA from other organism.
(B) Genetic engineering works only on animals and not yet successfully used on plants.
(C) There are no risk factors associated with r-DNA technology.
(D) The first step in PCR is heating which is used to separate both the strands of gene of interest.

Ans. (D)

Solution: PCR involves Denaturation, annealing, Extension

In Denaturation, at high temperature two strands are separated by breaking hydrogen bond

28. Choose the incorrect statement with reference to Kangaroo rat.

- (A) eliminates dilute urine.
(B) found in North American desert
(C) meets its water requirements through internal fat oxidation.
(D) uses minimal water to remove excretory products. **Ans. (A)**

Solution: Kangaroo rat has a mechanism of concentrating urine so that urine is sent with minimum water

29. During transcription the DNA strand with 3' → 5' polarity of the structural gene always acts as a template because

- (A) Nucleotides of DNA strand with 5' → 3' are transferred to mRNA.
(B) Enzyme DNA dependent RNA polymerase always catalyse the polymerisation in 5' → 3' direction.
(C) Enzyme DNA dependent RNA polymerase always catalyse the polymerisation in 3' → 5' direction.
(D) Enzyme DNA dependent RNA polymerase always catalyse polymerisation in both the directions.

Ans. (B)

Solution: From 3' → 5' template strand enzyme DNA dependent RNA polymerase Polymerises m RNA in 5' → 3' direction

30. According to David Tilman's long term ecosystem experiments, the total biomass in plots with more species shows,

- (A) No variation from year-to-year.
(B) Less variation from year-to-year.
(C) High variation from year-to-year.
(D) Average variation from year-to-year. **Ans. (B)**

Solution: DavidTilmans long term experiments concluded that as species diversity increases, stability increases.

More the stability-productivity increases, Year to year variation in productivity decreases

31. The toxic heavy metals from various industries which cause water pollution, normally have a density
 (A) more than 12.5 g/cm^3 (B) more than 5 g/cm^3
 (C) more than 15 g/cm^3 (D) more than 7.5 g/cm^3 **Ans. (B)**
32. Identify the correct option showing the relative contribution of different green house gases to the total global warming.
 (A) CFC-14%, CO_2 -60%, Methane-6%, N_2O -20%.
 (B) CFC-14%, CO_2 -60%, Methane-20%, N_2O -6%.
 (C) CFC-20%, CO_2 -60%, Methane-14%, N_2O -6%.
 (D) CFC-6%, CO_2 -60%, Methane-20%, N_2O -14%. **Ans. (B)**
33. A flower has 10 stamens each having bilobed dithecous anther. If each microsporangium has 5 pollen mother cells, how many pollen grains would be produced by the flower?
 (A) 1600 (B) 200 (C) 400 (D) 800 **Ans. (D)**
Solution: 10 stamens – bilobed i.e. $10 \times 2 = 20$ anther, each anther dithecous i.e. $20 \times 2 = 40$ microsporangium
 Each microsporangium has 5 MMC i.e. $40 \times 5 = 200$ MMC
 200 MMC through Meiosis produces 800 pollen grain (1 meiosis = 4 pollen grains)
34. From the following tools / techniques of genetic engineering, identify those, which are required for cloning a bacterial gene in animal cells and choose the correct option
 I. Endonuclease II. Ligase
 III. *A. tumefaciens* IV. Microinjection
 V. Gene gun VI. Lysozyme
 VII. Cellulase VIII. Electrophoresis
 (A) II, III, IV, VI, VII, VIII (B) II, III, V, VII, VIII
 (C) I, II, IV, VI, VIII (D) I, III, IV, V, VII **Ans. (C)**
Solution: Break the cell wall of bacteria using lysozyme enzyme to isolate DNA
 Using Restriction endonuclease generate fragments, isolate gene of interest through gel electrophoresis
 Using microinjection transfer the gene to animal cell, link the gene by DNA ligase enzyme
35. Identify the incorrect statement regarding the flow of energy between various components of the food chain
 (A) Each trophic level loses some energy as heat to the environment.
 (B) The amount of energy available at each trophic level is 10% of previous trophic level.
 (C) Energy flow is unidirectional.
 (D) Green plants capture about 10% of the solar energy that falls on leaves. **Ans. (D)**
Solution: Green plants capture only 1% of solar energy
36. Find out the correct match.
- | Disease | Pathogen | Main organ affected |
|----------------|-------------------|---------------------|
| (A) Dysentery | Protozoa | Liver |
| (B) Ringworm | Fungus | Skin |
| (C) Typhoid | Bacteria | Lungs |
| (D) Filariasis | Common round worm | Small intestine |
- Ans. (B)**
37. Match the following columns and choose the correct option:
- | Column-I | Column-II |
|---------------------------|----------------------|
| 1. Haemophilus influenzae | p. Malignant malaria |
| 2. Entamoeba histolytica | q. Elephantiasis |
| 3. Plasmodium falciparum | r. Pneumonia |
| 4. Wuchereria bancrofti | s. Amoebiasis |
- | | | | |
|-------|---|---|---|
| 1 | 2 | 3 | 4 |
| (A) r | p | q | s |
| (B) q | r | s | p |
| (C) r | s | p | q |
| (D) S | p | q | r |
- Ans. (C)**

38. When the vascular cambium is present between the xylem and phloem, then the vascular bundle is called,
 (A) Closed (B) Exarch (C) Open (D) Endarch **Ans. (C)**
Solution: Open to undergrow secondary growth
39. The function of Typhiosole in earthworm is
 (A) Increasing the effective area of absorption in the intestine
 (B) Grinding of soil particles
 (C) Grinding of decaying leaves
 (D) Transportation **Ans. (A)**
40. Select the correctly matched pair of organisms with their order.
 (A) Mangifera, indica : Primata
 (B) Triticum, aestivum : Sapindales
 (C) Musa, domestica : Diptera
 (D) Homo, sapiens : Poales **Ans. (C)**
Solution: Muscadomestica (Housefly) belong to order diptera
41. Match the column-I with column-II and choose the correct option from the following:
Column-1 (Plant groups) **Column-II (Examples)**
 1. Bryophyta p. Pinus
 2. Gymnosperm q. Adiantum
 3. Algae r. Sphagnum
 4. Pteridophyta s. Ectocarpus
- | | | | | |
|-----|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| (A) | q | s | r | r |
| (B) | s | r | q | p |
| (C) | r | p | s | q |
| (D) | q | p | s | r |
- Ans. (C)**
42. Flame cells present in the members of platyhelminthes are specialized to perform,
 (A) Respiration and Osmoregulation
 (B) Osmoregulation and Circulation
 (C) Osmoregulation and Excretion
 (D) Respiration and Excretion **Ans. (C)**
43. Identify the floral formula of plant belonging to potato family.
 (A) $\bar{O}, K_{(5)}, C_5, A_{(9)+1}, G_1$ $2) \bar{O}, K_{(5)}, C_5, A_5, \underline{G}_{(2)}$
 (C) $\bar{O}, K_{10}, C_{10}, A_{10}, \bar{G}_2$ (D) $\bar{O}, P_{3+3}, A_{3+3}, G_{(3)}$ **Ans. (B)**
Solution: epipetalous condition is the identifying feature of solanaceae
44. Toxicity of which micronutrient induces deficiency of iron, magnesium and calcium?
 (A) Boron (B) Zinc (C) Molybdenum (D) Manganese **Ans. (D)**
45. Considering the stroke volume of an adult healthy human being is 70 mL, identify the cardiac output in one hour from the following:
 (A) 50.40 Lit/hour (B) 504.0 Lit/hour (C) 30.24 Lit/hour (D) 302.4 Lit/hour **Ans. (D)**
46. Function of contractile vacuole in Amoeba is
 (A) Digestion and excretion (B) Excretion and osmoregulation
 (C) Digestion and respiration (D) Osmoregulation and movements? **Ans. (B)**
47. Match List-I and List-II with respect to proteins and their functions and select the correct option.
List-I **List-II**
 1. Collagen p. Fights infectious agents
 2. Trypsin q. Hormone
 3. Insulin r. Enzyme
 4. Antibody s. Intercellular ground substance
 (A) 1-s, 2-p, 3-r, 4-p (B) 1-q, 2-r, 3-q, 4-s (C) 1-s, 2-q, 3-r, 4-p (D) 1-s, 2-r, 3-q, 4-p
Ans. (D)

48. The complex formed by a pair of synapsed homologous chromosomes is called,
 (A) Univalent (B) Pentavalent (C) Triad (D) Bivalent **Ans. (D)**

Solution: In zygotene stage homologous chromosomes pair by forming synaptonemal complex

49. Match column-I with column-II. Select the option with correct combination.

Column-1

Column-II

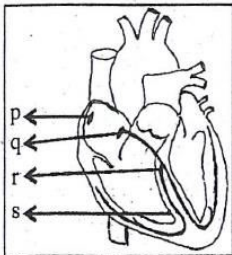
- | | |
|----------------|--|
| 1. Hypertonic | p. Two molecules move in the same direction across the membrane. |
| 2. Capillarity | q. External solution is more concentrated than cell sap |
| 3. Symport | r. Water loss in the form of droplets. |
| 4. Guttation | s. Ability of water to rise in thin tubes. |

- A) 1-q, 2-s, 3-p, 4-r B) 1-q, 2-s, 3-r, 4-p C) 1-q, 2-r, 3-p, 4-s D) 1-q, 2-p, 3-s, 4-r **Ans. (A)**

50. In Bryophyllum, the adventitious buds arise from
 A) Leaf base B) Leaf axil C) Notches in the leaf margin D) Shoot apex **Ans. (C)**

51. Primary endosperm' nucleus is formed by fusion of
 (A) Two polar nuclei and two male gametes
 (B) Two polar nuclei and one male gamete
 (C) Ovum and male gamete
 (D) One polar nucleus and male gamete **Ans. (B)**

52. Identify the option showing the correct labelling for p, q, r and. s with reference to the conducting system of the human heart.



- (A) p- Interventricular septum, q-AVN, r-Bundle of His, s-SAN
 (B) p-SAN, q-AVN, r-Bundle of His, s-Interventricular septum
 (C) p-AVN, q-SAN, r-Interventricular septum, s-Bundle of His
 (D) p-Bundle of His, q-SAN, r-Interventricular septum, s-AVN **Ans. (B)**

53. Atrial Natriuretic Factor (ANF) acts as a
 (A) Hypertension inducer
 (B) Check on Renin-Angiotensin mechanism
 (C) Promoter on Renin-Angiotensin mechanism
 (D) Vasoconstricter **Ans. (B)**

Solution: ANF is a vasodilator, it checks(Stops) RAAS pathway to lower BP

54. The vibrations from the ear drum are transmitted, through ear ossieles to
 (A) Auditory nerves (B) Cochlea
 (C) Oval window (D) Tectorial membrane **Ans. (C)**

Solution: Ear ossicles amplify sound waves and sends to oval window of cochlea

55. Bamboo species flowers
 (A) Twice in 50-100 years (B) Every year
 (C) Once in 12 years (D) Once in lifetime **Ans. (D)**

56. With reference to human sperm, match the Lis

List-1

List-II

- | | |
|-----------------|------------------------|
| 1. Head | p. Filled with enzyme |
| 2. Acrosome | q. Contains mitochond |
| 3. Middle piece | r. Sperm motility |
| 4. Tail | s. Contains haploid nu |

Choose the correct option from the following

- A) 1-r, 2-q, 3-s, 4-p B) 1-s, 2-p, 3-q, 4-r C) 1-s, 2-r, 3-p, 4-q D) 1-q, 2-s, 3-r, 4-p

Ans. (B)

57. Which pair of the following cells in the embryo sac are destined to change their ploidy after fertilization?

- (A) Egg cell and central cell (B) Antipodals and synergids
(C) Synergids and egg cel (D) Central cell and antipodals

Ans. (A)

58. In the female reproductive system, a tiny finger like structure which lies at the upper junction of the two labia minora above the urethral opening is called

- (A) Vagina (B) Hymen (C) Mons pubis (D) Clitoris

Ans. (D)

59. Consider the following statements with reference to female reproduction system:

Statement 1. The presence or absence of hymen is not a reliable indicator of virginity or sexual experience.

Statement 2. The sex of the foetus is determined by the father and not by the mother.

Choose the correct option from the following:

- (A) Both the Statement 1 and Statement 2 are wrong.
(B) Statement 1 is correct and Statement 2 is wrong.
(C) Both the Statement 1 and Statement 2 are correct.
(D) Statement 1 is wrong and Statement 2 is correct.

Ans. (C)

Solution: hymen covering vagina can be torn due to physical activities hence its not a reliable indicator of virginity

If sperm carrying X chromosome fertilised egg foetus will be female, if sperm carrying Y chromosome fertilises egg foetus will be male

60. The male sex accessory ducts include,

- (A) Rete testis, vasa efferentia, epididymis and vas deferens
(B) Rete testis, vasa efferentia, epididymis and seminal vesicle
(C) Rete testis, urethra, epididymis and vas deferens
(D) Rete testis, vasa efferentia, seminal vesicle and vas deferens

Ans. (A)

