Sample Paper-01

Dropper NEET (2024)

BOTANY

SECTION-A

1. Given below are two statements, Assertion (A) and Reason (R). Choose the **correct** option for them.
Assertion (A): Gametes receive only one allele of a gene.
Reason (R): During gamete formation, homologous chromosomes segregate.
(1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

2. Mendel proposed that the factor controlling any character is discrete and independent. His proposition was based on the;
(1) results of F_3 generation of a cross.
(2) observations that the offspring of a cross made between the plants having two contrasting characters shows only one character without any blending.
(3) self-pollination of F_1 offsprings.
(4) cross pollination of F_1 generation with recessive parent.

3. The concept of carrying capacity is associated with;
(1) maximum population size that a species can reach.
(2) minimum population size required to prevent extinction.
(3) optimum population size for genetic diversity.
(4) the number of individuals required for successful reproduction.

4. Find the **incorrect** statement w.r.t the Pteridophytes:
(1) Pteridophytes are used for medicinal purposes and as soil-binders.
(2) Evolutionarily, they are the first terrestrial plants to possess vascular tissues – xylem and phloem.
(3) In pteridophytes, the main plant body is a gametophyte.
(4) The pteridophytes are found in cool, damp, shady places though some may flourish well in sandy-soil conditions.

5. _____ of an ecosystem is the rate of production of organic matter during photosynthesis.
(1) Net primary productivity
(2) Secondary productivity
(3) Gross primary productivity
(4) None of the above

6. Read the given statements carefully and choose the **correct** option.
Statement I: The 'bakanae' (foolish seedling) disease of rice seedlings, was caused by a fungal pathogen *Gibberella fujikuroi*.
Statement II: E. Kurosawa reported the appearance of symptoms of the bakanae disease in rice seedlings when they were treated with sterile filtrates of the fungus later identified as cytokinins.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct but Statement II is incorrect.
(3) Statement I is incorrect but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

7. True nucleus is absent in;
(1) *Funaria* (2) *Volvox*
(3) *Anabaena* (4) *Mucor*

8. Identify the correct statements about pollen grain and choose the **correct** option.
(A) It has two layered prominent wall.
(B) Hard outer wall layer.
(C) Inner wall is composed of sporopollenin.
(D) Sporopollenin forms continuous exine.
(1) A, B, C, D (2) A, B, C only
(3) A, B only (4) B, D only

9. The terminator site and the promoter site for transcription are located at;
(1) 3' (downstream) end and 5' (upstream) end, respectively of the transcription unit.
(2) 5' (upstream) end and 3' (downstream) end, respectively of the transcription unit.
(3) the 5' (upstream) end.
(4) the 3' (downstream) end.

10. Match **List-I** with **List-II** to find out the **correct** option.

List I		List II	
(I)	Chalaza	(A)	Parenchymatous mass
(II)	Nucellus	(B)	Junction between ovule and funicle
(III)	Micropyle	(C)	Basal part of ovule
(IV)	Hilum	(D)	Integument is absent

(1) I-(C), II-(A), III-(D), IV-(B)
(2) I-(A), II-(C), III-(D), IV-(B)
(3) I-(C), II-(D), III-(A), IV-(B)
(4) I-(B), II-(C), III-(A), IV-(D)

11. Given below are two statements, Assertion (A) and Reason (R). Choose the **correct** option for them.

Assertion (A): The codon is read in mRNA in a contiguous fashion.

Reason (R): There are no punctuations in the codon.

(1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A).**
(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

12. Match the following lists and select the **correct** option.

List I (Organism)	List II (Extincted from)
I. Dodo	A. Africa
II. Quagga	B. Russia
III. Thylacine	C. Mauritius
IV. Stellar's sea cow	D. Australia

(1) I-C, II-A, III-D, IV-B
(2) I-A, II-B, III-D, IV-C
(3) I-C, II-D, III-A, IV-B
(4) I-B, II-D, III-C, IV-A

13. Read the given statements carefully and choose the **correct** option.

Statement I: Joseph Priestley performed a series of experiments that revealed the essential role of air in the growth of green plants.

Statement II: Joseph Priestley discovered oxygen in the year 1774.

(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

14. In the following question, a statement of assertion is followed by a statement of reason. Choose the **correct** option for them.

Assertion (A): The non-cyclic photophosphorylation represents the Z-scheme.

Reason (R): The shape of the Z- scheme is formed when all the electron carriers are placed in a sequence on a redox potential scale.

(1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A).**
(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

15. If log A = 4, Z = 0.3 and logC = 0.8, what is log S?

(1) 3.76 (2) 100
(3) 4.24 (4) 2

16. In the following question, a statement of assertion is followed by a statement of reason. Choose the **correct** option for them.

Assertion (A): The golgi apparatus remains in close association with the endoplasmic reticulum.

Reason (R): Proteins synthesized by ribosomes on the endoplasmic reticulum are modified in the cisternae of the golgi apparatus.

(1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A).**
(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

17. In which phase of mitosis, chromosomes lose their individuality?
(1) Prophase
(2) Metaphase
(3) Anaphase
(4) Telophase

18. During chemiosmosis, the function of primary acceptor of electron is to;
(1) transport proton from the stroma to lumen.
(2) transport proton from the lumen to stroma.
(3) donate proton to a proton carrier.
(4) donate electron to a proton carrier.

19. Read the given statements carefully and choose the **correct** option.

Statement I: The dicot plants not only show open form of growth but also have open vascular bundles.

Statement II: Plant growth can be measured only in the form of absolute growth rate.

(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

20. In the following question, a statement of assertion is followed by a statement of reason. Choose the **correct** option for them.

Assertion (A): The axonemal microtubules (9+2 array) are arranged in a cylindrical manner throughout the length of cilium or flagellum.

Reason (R): The base of a cilium or flagellum is made up of centriole-like structure.

(1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

21. The evolution of the C_4 photosynthesis system is probably one of the strategies for;
(1) minimizing the availability of CO_2.
(2) maximizing the water loss.
(3) maximizing the availability of CO_2 while maximizing the water loss.
(4) maximizing the availability of CO_2 while minimizing the water loss.

22. After the primary producer level in an ecosystem;
(1) less and less amount of new chemical energy is added at successive trophic levels.
(2) no new chemical energy is added at successive trophic levels.
(3) more and more amount of new chemical energy is added at successive trophic levels.
(4) less amount of new chemical energy is added at primary consumer level and then the amount of new chemical energy added to successive levels becomes more and more.

23. **Assertion (A):** Glucose is oxidized in several small steps.

Reason (R): The energy released during respiration can be coupled to synthesize ATP.

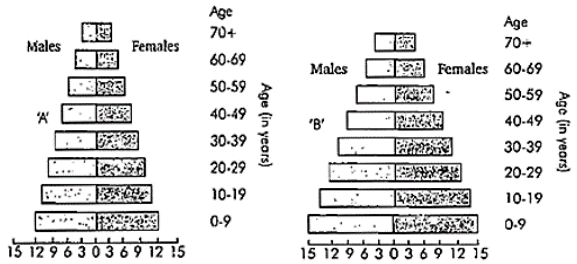
(1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A).**
(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

24. **Statement I:** The parenchymatous cells which lie between the xylem and the phloem are called conjunctive tissue in dicot root.

Statement II: In dicot root, pericycle takes part in the formation of vascular cambium.

(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

25. A country with a high rate of population growth took measures to reduce it. The figure below shows age sex pyramids of populations A and B twenty years apart. Select the **correct** interpretation about them.



(1) 'A' is more recent and shows slight reduction in the growth rate.
(2) 'B' is earlier pyramid and shows stabilized growth rate.
(3) 'B' is more recent showing that population is very young.
(4) 'A' is the earlier pyramid and no change has occured in the growth rate.

26. One of the major difficulties in the biological control of insect/pest is that;
(1) the method is less effective as compared with the use of insecticides.
(2) the practical difficulty of introducing the predator to specific areas.
(3) the predator develops a preference to other diets and may itself become a pest.
(4) the predator does not always survive when transferred to a new environment.

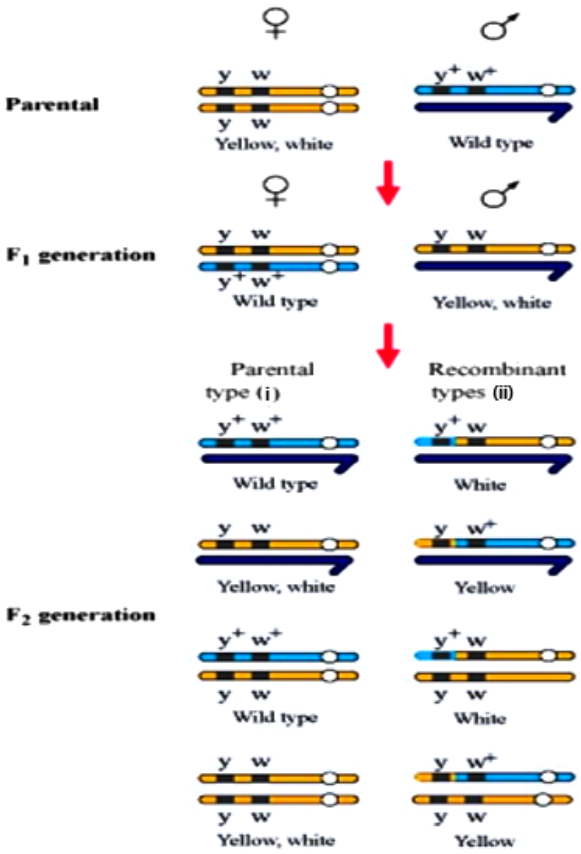
27. The nurses working in the maternity ward of a hospital suspect that they have accidentally mixed up three babies when tagging them after birth. Blood typing of the three couples and the three babies involved was done to match each baby to the right family. The following results were obtained;

Baby 1: Type B	Baby 2: Type A
Baby 3: Type O	
Mr Singh: Type O	Mrs Singh: Type AB
Mr Sisodia: Type A	Mrs Sisodia: Type O
Mr Mehra: Type AB	Mrs Mehra: Type B

What can be inferred from the above data?
(1) Baby 1 belongs to the Singh family.
(2) Baby 2 belongs to the Mehra family.
(3) Baby 3 belongs to the Sisodia family.
(4) All of the above

28. Respiratory infection is caused by;
(1) Adenovirus
(2) TMV
(3) *Propionibacterium*
(4) HIV

29.



In above diagram, (i) & (ii) respectively, are;
(1) (i) – 62.8%, (ii) – 37.2%
(2) (i) – 98.7%, (ii) – 1.3%
(3) (i) – 37.2%, (ii) – 62.8%
(4) (i) – 1.3%, (ii) – 98.7%

30. Which of the following statements is **incorrect** regarding gymnosperms?
(1) Leaves of gymnosperms are well adapted to withstand extremes of temperature, humidity and wind.
(2) In *Pinus* the pinnate leaves persist for a few years.
(3) In *Cycas* stems are unbranched.
(4) In *Pinus* male or female cones are borne on the same tree.

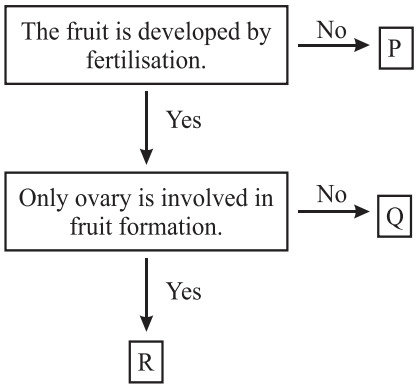
31. **Assertion (A):** Interphase nucleus has a loose and indistinct network of nucleoprotein fibres.
Reason (R): During different stages of cell division, cells show structured chromosomes.
(1) Both **Assertion (A)** and **Reason (R)** are the true, and **Reason (R)** is a correct explanation of **Assertion (A).**
(2) Both **Assertion (A)** and **Reason (R)** are the true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

32. Match **List-I** with **List-II** to find out the **correct** option.

List I (Scientist)		List II (Discovery)	
(I)	Joseph Priestley	(A)	Green plant parts synthesize sugar
(II)	Jan Ingenhousz	(B)	Source of oxygen is H_2O, not CO_2
(III)	Julius von Sachs	(C)	Oxygen is released from the green parts of the plants
(IV)	Cornelius van Niel	(D)	Plants purify fouled air

	I	II	III	IV
(1)	A	D	C	B
(2)	D	B	C	A
(3)	B	A	C	D
(4)	C	D	A	B

33. Refer to the given flow chart and identify P, Q and R.



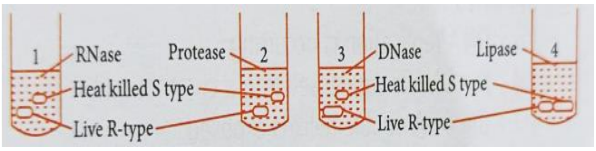
	P	Q	R
(1)	Strawberry	Orange	Cashew
(2)	Banana	Apple	Mango
(3)	Castor	Coconut	Pea
(4)	Mulberry	Mustard	Coriander

34. Match **List-I** with **List-II** and select the **correct** option.

List-I		List-II	
(I)	Family	(A)	*tuberosum*
(II)	Kingdom	(B)	Polymoniales
(III)	Order	(C)	*Solanum*
(IV)	Specific epithet	(D)	Plantae
(V)	Genus	(E)	Solanaceae

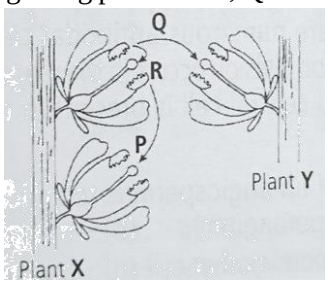
	I	II	III	IV	V
(1)	E	D	B	A	C
(2)	E	D	A	C	B
(3)	A	B	C	E	D
(4)	B	A	C	D	E

35. Study the following figures and identify the **correct** option where transformation of R type into S type will occur, w.r.t Griffith's transformation experiments.



(1) Only in 3
(2) In both 1 and 2
(3) In both 2 and 3
(4) In 1, 2 and 4

36. Refer to the given diagram and select the **correct** option regarding processes P, Q and R.



(1) Processes P, Q and R introduce genetic variability in the offspring of sexually reproducing plants X and Y.
(2) Water serves as agent for process Q if plants X and Y belong to genus *Salvia*.
(3) Flowers of plants X and Y need to produce odour and nectar for completion of processes P and Q if they are entomophilous.
(4) If plants X and Y belong to genus *Zostera*, then their flowers need to produce sticky and heavy pollens in very small amount for accomplishment of process Q.

37. Identify the true statement(s) from the following and choose the **correct** option.

A. Centrioles are spherical structures that lie parallel to each other.
B. Centrioles have an organization like cartwheel.
C. Centrioles are made up of nine evenly spaced peripheral fibrils of tubulin protein.
D. Each peripheral fibril of centriole is triplet.

(1) A, B and D only
(2) A and C only
(3) B, C and D only
(4) A, C and D only

38. **Statement I:** *Neurospora* is extensively used in biochemical and genetical studies.
Statement II: Both *Claviceps* and *Neurospora* have conidia present endogenously on branched or unbranched conidiophores.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

39. During alcoholic fermentation by yeast two molecules of glucose produce:
(1) 3 molecules of ethanol + 3 molecules of CO_2
(2) 6 molecules of ethanol + 6 molecules of CO_2
(3) 2 molecules of ethanol + 2 molecules of CO_2
(4) 4 molecules of ethanol + 4 molecules of CO_2

40. The birth and death rates of four countries are given below. Which one will have the least population growth rate?

Country	Birth rate/1000	Death rate/1000
P	15	5
Q	25	10
R	35	18
S	48	41

(1) P (2) Q
(3) R (4) S

41. Formation of ribosomal Rna occurs in;
(1) Golgi apparatus (2) Nucleolus
(3) Microbodies (4) Ribosomes

42. What will be the amount of DNA in meiosis I products if a meiocyte contains 20 pg DNA in G1 phase?
(1) 10 pg (2) 20 pg
(3) 40 pg (4) 80 pg

43. Select the group of taxa representing the same category of taxonomic hierarchy.
(1) sativum, tuberosum, indica
(2) Solanum, nilotica, Brassica
(3) Potato, tomato, Fabaceae
(4) Petunia, Datura, Solanaceae

44. Read the following statements and choose **correct** option.
Statement-I: Root cap protects the root.
meristem from the friction of the soil.
Statement-II: Meristematic zone cells are thick walled.
(1) Both statement I and II are correct.
(2) Statement I is correct but statement II is incorrect.
(3) Statement I is incorrect but statement II is correct.
(4) Both statement I and II are incorrect.

45. **Assertion (A):** Ovary in hypogynous flowers is said to be superior.
Reason (R): Gynoecium in such flowers occupies the highest position, while other parts are situated below it.
(1) Both **Assertion (A)** and **Reason (R)** are the true and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are the true but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true and **Reason (R)** is false.
(4) **Assertion (A)** and **Reason (R)** both are false.

46. Radial vascular bundle means;
(1) Xylem and Phloem at the different radius in Stem
(2) Xylem and Phloem at different radius in root
(3) Xylem and Phloem at same radius in Stem
(4) Xylem and Phloem at same radius in leaf

47. ABA acts as an antagonist to;
(1) NAA (2) IBA
(3) IAA (4) GAs

48. Two species competing for the same resource can avoid competition by choosing different habits. This phenomenon is called _____ and was supported by _____.
(1) competitive exclusion, Gause
(2) competitive exclusion, MacArthur
(3) resource partitioning, Gause
(4) resource partitioning, MacArthur

49. The first step of alcoholic fermentation from pyruvate is;

(1) Dehydrogenation
(2) Oxidation
(3) Decarboxylation
(4) Oxidative decarboxylation

50. How many molecules of RuBP & CO_2 respectively are required for the production of 6 molecules of 3-PGA?

(1) 3 and 2 (2) 2 and 3
(3) 3 and 3 (4) 3 and 1

Sample Paper-01

Dropper NEET (2024)

BOTANY

ANSWER KEY

1.	(1)	26.	(3)
2.	(2)	27.	(3)
3.	(1)	28.	(1)
4.	(3)	29.	(2)
5.	(3)	30.	(2)
6.	(2)	31.	(2)
7.	(3)	32.	(4)
8.	(3)	33.	(2)
9.	(1)	34.	(1)
10.	(1)	35.	(4)
11.	(1)	36.	(3)
12.	(1)	37.	(3)
13.	(1)	38.	(2)
14.	(1)	39.	(4)
15.	(4)	40.	(4)
16.	(1)	41.	(2)
17.	(4)	42.	(1)
18.	(4)	43.	(1)
19.	(2)	44.	(2)
20.	(2)	45.	(1)
21.	(4)	46.	(2)
22.	(2)	47.	(4)
23.	(1)	48.	(4)
24.	(1)	49.	(3)
25.	(1)	50.	(3)

HINTS AND SOLUTION

1. (1)

Meiosis occurs during the process of gamete formation which leads to the formation of haploid gametes. Though the parents contain two alleles during gamete formation, the factors or alleles of a pair segregate from each other such that a gamete receives only one of the two alleles. The two alleles of a gene are present on two homologous chromosomes.

2. (2)

Mendel crossed two parent plants having contrasting characters. He found that in the first filial generation, F_1 generation, the dominant of the two expressed while the recessive is suppressed. Apart from this, When the F_1 generation is self-crossed, in the F_2 generation, these recessive characters appear again. Therefore, it is not that they have disappeared.

3. (1)

The carrying capacity of an organism is the maximum population size of the species that the environment can sustain indefinitely beyond which there is no further growth.

4. (3)

Pteridophytes are used for medicinal purposes and as soil-binders. Evolutionarily, they are the first terrestrial plants to possess vascular tissues-xylem and phloem. In pteridophytes, the main plant body is a sporophyte. The pteridophytes are found in cool, damp, shady places though some may flourish well in sandy-soil conditions.

5. (3)

The rate of production of total organic matter during photosynthesis is called the gross primary productivity. It is also equal to the amount of carbon fixed during photosynthesis by all producers in that particular ecosystem.

6. (2)

The 'bakanae' (foolish seedling) disease of rice seedlings, was caused by a fungal pathogen *Gibberella* fujikuroi. E. Kurosawa (1926) reported the appearance of symptoms of the disease in rice seedlings when they were treated with sterile filtrates of the fungus. The active substances were later identified as gibberellic acid.

7. (3)

Funaria is a moss belonging to bryophytes under the kingdom Plantae.

Volvox is a green alga belonging to family Volvocaceae under the kingdom Plantae.

Anabaena is a blue-green alga belonging to phylum Cyanobacteria under the kingdom Monera

Mucor is a fungus belonging to phylum Zygomycota under the kingdom Fungi.

Funaria, *Volvox*, and *Mucor* have domain Eukaryota while *Anabaena* has domain Prokaryota. Eukaryotes have membrane-bound well-defined nucleus whereas. Prokaryotes do not have a membrane-bound nucleus because, in them, the genetic material lies freely in the cytoplasm. Hence, the true nucleus is absent in *Anabaena*.

8. (3)

Pollen grains are generally spherical measuring about 25-50 micro meters in diameter. It has a prominent two-layered wall. The hard outer layer called the exine is made up of sporopollenin which is one of the most resistant organic material known. Pollen grain exine has prominent apertures called germ pores where sporopollenin is absent.Therefore Outer layer is discontinuous. The inner wall of the pollen grain is called the intine. It is a thin and continuous layer made up of cellulose and pectin.

9. (1)

The promoter sequence needs to lie in front of the start site or upstream to it in the 5’ end and the terminator should lie in the 3' end downstream as transcription proceeds in the 5' to 3' direction.

10. (1)

Chalaza = Basal part of ovule

Nucellus = Parenchymatous mass

Micropyle = Integument is absent

Hilum = Junction between ovule and funicle

11. (1)

The codon is read in mRNA in a contiguous (continuous) fashion. There is no punctuation (comma) between the adjacent codons i.e., each codon immediately followed by the next codon.

12. (1)

The IUCN Red List (2004) documents the extinction of 784 species (including 338 vertebrates, 359 invertebrates and 87 plants) in the last 500 years. Some examples of recent extinctions include the dodo (Mauritius), quagga (Africa), thylacine (Australia), Steller's Sea Cow (Russia) and three subspecies (Bali, Javan, Caspian) of tiger.

13. (1)

Joseph Priestley performed a series of experiments that revealed the essential role of air in the growth of green plants. Joseph Priestley discovered oxygen in the year 1774.

14. (1)

This whole scheme of transfer of electrons, starting from the PS II, uphill to the acceptor, down the electron transport chain to PSI, excitation of electrons, transfer to another acceptor, and finally downhill to $NADP^+$ causing it to be reduced to $NADPH^+$ H^+ is called as the Z scheme, due to its characteristic shape. This shape is formed when all the carriers are placed in a sequence on the redox potential scale.

15. (4)

$\log S = \log C + Z \log A$

$= 0.8 + 0.3 \times 4 = 0.8 + 1.2 = 2.0$

16. (1)

Golgi apparatus remains in close association with the endoplasmic reticulum because a number of proteins synthesised by ribosomes on the ER are modified in the cisternae of the GB before they are released from the trans face.

17. (4)

During telophase, chromatids have reached their respective poles, decondense and lose their individuality

18. (4)

As electrons move through the photosystems, protons are transported across the membrane. This happens because the primary accepter of electron which is located towards the outer side of the membrane transfers its electron not to an electron carrier but to an H carrier (proton carrier).

19. (2)

The dicot plants not only show open form of growth i.e; form of growth wherein new cells are always being added to the plant body by the activity of the meristem. They also have open vascular bundles i.e; possess cambium. Plant growth can be measured in the form of absolute growth rate & relative growth rate.

20. (2)

The axonemal microtubules (9 + 2 array) are arranged in a cylindrical manner throughout the length of cilium or flagellum.

The axoneme usually has nine pairs or doublets of radially arranged peripheral microtubules and a pair of centrally located microtubules.The base of a cilium or flagellum is made up of centriole-like structure having 9+0 arrangement.

21. (4)

The evolution of the C_4 photosynthetic system is probably one of the strategies for maximizing the availability of CO_2 while minimizing water loss.

22. (2)

The chemical energy of food is the main source of energy required by all living organisms. This energy is transmitted to different trophic levels along the food chain. However, After the primary producer level in an ecosystem, no new chemical energy is added at successive trophic levels.

23. (1)

The plant cell uses the strategy to catabolise the glucose molecule in such a way that not all the liberated energy goes out as heat. The key is to oxidise glucose not in one step but in several small steps enabling some steps to be just large enough such that the energy released can be coupled to ATP synthesis.

24. (1)

The parenchymatous cells which lie between the xylem and the phloem in dicot root are called conjunctive tissue. Conjunctive tissue also help in secondary growth in dicot roots by forming vascular cambium. In dicot root, pericycle is completely parenchymatous. During secondary growth, a part of pericycle present outer to the protoxylem, transformed into a secondary meristem called vascular cambium.

25. (1)

The figure below shows age sex pyramids of populations A and B twenty years apart. 'A' is more recent and shows slight reduction in the growth rate.

26. (3)

The predator develops a preference to other diets and may itself becomes a pest; is one of the major difficulties in the biological control of insect pests. Biological control is a component of an integrated pest management strategy reduces the pest populations by natural enemies and typically involves an active human role. Natural enemies of insect pests, also known as biological control agents, include predators, parasitoids, and pathogens. Biological control of weeds includes insects and pathogens.

27. (3)

Baby 3 belongs to the Sisodia family.

28. (1)

Respiratory infection is caused by Adenovirus. Adenoviruses are a group of viruses that typically cause respiratory illnesses, such as a common cold, conjunctivitis (an infection in the eye that is sometimes called pink eye), croup, bronchitis, or pneumonia. In children, adenoviruses usually cause infections in the respiratory tract and intestinal tract.

29. (2)

In above diagram, (i) & (ii) are 98.7% & 1.3% respectively.

30. (2)

Leaves of gymnosperms are well adapted to withstand extremes of temperature, humidity and wind. In Cycas the pinnate leaves persist for a few years. In Cycas stems are unbranched. In Pinus male or female cones are borne on the same tree.

31. (2)

The interphase nucleus has a loose and indistinct network of nucleoprotein fibres called chromatin, but during different stages of cell division, cells show ’structured chromosomes" in place of the nucleus.

32. (4)

Joseph Priestley = Plants purify fouled air
Jan Ingenhousz = Source of oxygen is H_2O, not CO_2
Julius von Sachs = Oxygen is released from the green parts of the plants
Cornelius van Niel = Green plant parts synthesize sugar

33. (2)

Banana are formed without the act of fertilization. In apple, false fruit is formed i.e. False fruits develop from any other part of the plant except ovary. In mango, true fruit is formed i.e., true fruit is fruit which develops only from ovary.

34. (1)

Family = Solanaceae, Kingdom = Plantae
Order = Polymoniales.
Specific epithet = tuberosum
Genus = Solanum

35. (4)

The figures where transformation of R type into S type will occur, w.r.t Griffith’s transformation experiments are (1), (2) & (4). because DNA is present there. However in figure (3) due to addition of dnase, DNA is cleaved as a result of which no transformation occurs there.

36. (3)

Flowers of plants X and Y need to produce odour and nectar for completion of processes P(Geitonogamy) and Q (Xenogamy) if they are entomophilous.

37. (3)

Centrioles have an organization like cartwheel. Centrioles are made up of nine evenly spaced peripheral fibrils of tubulin protein. Each peripheral fibril of centriole is triplet. Centrioles are spherical structures that lie perpendicular each other.

38. (2)

Neurospora is extensively used in biochemical and genetical studies. Mycelium is branched and septate. The asexual spores are conidia produced exogenously on the special mycelium called conidiophores.

39. (4)

During alcoholic fermentation by yeast two molecules of glucose produce 4 molecules of ethanol + 4 molecules of CO_2.

40. (4)

Growth rate = Birth rate-death rate For country P, it is 10/1000. For country Q, It is 15/1000 For country R, it is 17/1000. For country S, It is 7/1000 Hence, country S has the least population growth rate.

41. (2)

The nucleoli are spherical structures present in the nucleoplasm. The content of nucleolus is continuous with the rest of the nucleoplasm as it is not a membrane bound structure. It is a site for active ribosomal RNA synthesis.

42. (1)

Meiocyte is a cell that has undergone meiosis. Meiosis is a reductional division. So the cell must have 10 pg DNA in meiosis I, which is then reduced to 20 pg following reductional division.

43. (1)

A species is a taxonomic group or category that included all the interbreeding organisms of a population. Here, sativum, tuberosum, and indica all represent species of different plants. Hence, they represent the same taxonomic group.

44. (2)

Root cap protects the root meristem from the friction of the soil.
Meristematic zone cells are small and thin walled.

45. (1)

If the gynoecium occupies the highest position in comparison to the other parts of the flower, then such kind of flower is described as hypogynous. The ovary is superior (having flower parts attached below the ovary). Examples are mustard, china rose, hibiscus, brinjal, etc.

46. (2)

Radial vascular bundle are present in roots.
Radical vascular bundles are those in which xylem and phloem occur in different radii.

47. (4)

A higher concentration of ABA leads to seed dormancy and promotes senescence whereas a higher concentration of GA promotes seed germination and delays senescence. Therefore ABA & GAs act as antagonists to each other.

48. (4)

According to the mechanism of resource partitioning (supported by Mac Arthur), if two species compete for the same resource, they could avoid competition by choosing, for instance, different times for feeding or different foraging patterns. Two species evolve to become different too reduce competition, so that species can co-exist.

49. (3)

In alcoholic fermentation, pyruvate is first converted into acetaldehyde with the help of the enzyme pyruvate decarboxylase, and carbon dioxide is released. In the next step, acetaldehyde is reduced to ethanol.

50. (3)

In Calvin cycle, when one molecule of RuBP(5C) combines with one molecule of CO_2 (1C) two molecules of 3-PGA (3C) are formed. Therefore, for the production of 6 molecules of 3-PGA three molecules of RuBP and three molecules of CO_2 are required.

ZOOLOGY

SECTION-A

1. Read the following statements.

A. The cells of germinal epithelium are cuboidal.

B. The main function of stratified squamous epithelium is protection.

C. The cilliated epithelium is found in trachea and fallopian tubes.

D. The transitional epithelium is found in renal cortex.

(1) All are correct

(2) Only A & B are correct

(3) Only A, B & C are correct

(4) Only B, C & D are correct

2. Amount of water and protein present in blood plasma is

(1) 40 - 42% & 7 - 8%

(2) 60 - 65% & 9 - 10%

(3) 70 - 80% & 10 - 12%

(4) 90 - 92% & 6 - 8%

3. Match the following cell structure with its characteristic feature.

	Column-1		Column-II
(A)	Tight junctions	(I)	Cement neighbouring cells together to form sheet
(B)	Adhering	(II)	Transmit information junctions through chemical to another cells
(C)	Gap junctions	(III)	Establish a barrier to prevent leakage of fluid across epithelial cells
(D)	Synaptic junctions	(IV)	Cytoplasmic channels to facilitate communication between adjacent cells

(1) (A)-(IV) (B)-(III) (C)-(I) (D)-(II)

(2) (A)-(II) (B)-(IV) (C)-(I) (D)-(III)

(3) (A)-(IV) (B)-(II) (C)-(I) (D)-(III)

(4) (A)-(III) (B)-(I) (C)-(IV) (D)-(II)

4. Consider the following statements.

I. Fibrinogens are needed for clotting or coagulation of blood.

II. Albumins are involved in defense mechanisms of the body.

(1) Statement I is correct but II is incorrect

(2) Statement I is incorrect but II is correct

(3) Both statements I & II are correct

(4) Both statements I & II are incorrect

5. Match **column I** with **column II**.

Column I		Column II	
A.	Saltation	I.	Darwin
B.	Formation of life was preceded by Chemical evolution	II.	Louis pasteur
C.	Reproductive fitness	III.	De vries
D.	Life comes from pre-existing life	IV.	Oparin and Haldane

	A	B	C	D
(1)	III	IV	I	II
(2)	II	III	IV	I
(3)	III	I	II	IV
(4)	III	IV	II	I

6. Match **List - I** with **List – II**.

List - I		List - II	
(A)	Cellular barrier	(I)	Interferons
(B)	Cytokine barrier	(II)	Mucus
(C)	Physical barrier	(III)	Neutrophils
(D)	Physiological barrier	(IV)	HCl in gastric juice

Choose the **correct** answer from the options given below:

(1) (A) - (III), (B) - (I), (C) - (II), (D) - (IV)

(2) (A) - (II), (B) - (III), (C) - (IV), (D) - (I)

(3) (A) - (II), (B) - (III), (C) - (I), (D) - (IV)

(4) (A) - (III), (B) - (IV), (C) - (II), (D) - (I)

7. Which of the following statement is **incorrect**?
(1) ADH helps in water elimination making urine hypotonic.
(2) Protein free fluid is filtered from blood plasma into the Bowman's capsule.
(3) Glucose is actively reabsorbed in the proximal convoluted tubule.
(4) Henle's loop plays an important role in concentrating the urine.

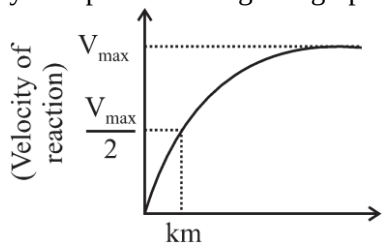
8. Pseudocoelomate phylum is
(1) Aschelminthes
(2) Platyhelminthes
(3) Annelida
(4) Arthropoda

9. **Assertion (A):** The bulbourethral gland is a male accessory gland.
Reason (R): Its secretion helps in the lubrication of the penis, thereby facilitating reproduction.
In the light of the above statements, choose the **correct** answer from the options given below:
(1) Both **Assertion (A)** and **Reason (R)** are correct and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are correct but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is correct and **Reason (R)** is not correct.
(4) Both **Assertion (A)** and **Reason (R)** is incorrect.

10. Which of the following is **not** a characteristic of chordates?
(1) Notochord present
(2) A post-anal tail
(3) Pharynx perforated by gills slits
(4) Heart is dorsal in position

11. Which of the following is limbless Amphibia?
(1) *Hyla*
(2) *Salamandra*
(3) *Ichthyophis*
(4) *Bufo*

12. Which of the following factors affecting enzyme activity is depicted in the given graph?



(1) pH
(2) Temperature
(3) Product concentration
(4) Substrate concentration

13. **Assertion (A):** All enzymes are not proteinaceous in nature.
Reason (R): Ribozymes are not proteinaceous in nature.
Choose the appropriate option.
(1) **Assertion (A)** is correct but **Reason (R)** is not correct.
(2) **Assertion (A)** is not correct but **Reason (R)** is correct.
(3) Both **Assertion (A)** and **Reason (R)** are correct and **Reason (R)** is the correct explanation of **Assertion (A)**.
(4) Both **Assertion (A)** and **Reason (R)** are correct but **Reason (R)** is not the correct explanation of **Assertion (A)**.

14. Nearly all of the essential nutrients and 70-80% of electrolytes and water are reabsorbed in which segment of nephron?
(1) PCT
(2) Ascending limb of loop of Henle
(3) Descending limb of loop of Henle
(4) DCT

15. When a neuron is not conducting any impulse i.e, resting, the axonal membrane comparatively _____ to potassium ions (K^+) and nearly _____ to sodium (Na^+) ions.
(1) Less permeable, impermeable respectively
(2) More permeable, impermeable respectively
(3) Less permeable, more impermeable respectively
(4) Impermeable, impermeable respectively

16. **Assertion (A):** When a particular restriction enzyme cuts strand of DNA, overhanging stretches or sticky ends are formed.

Reason (R): Some restriction enzymes cut the strand of DNA a little away from the centre of palindromic site.

In the light of the above statements, choose the **correct** answer from the options given below:

(1) **Assertion (A)** is not correct but **Reason (R)** is correct.

(2) Both **Assertion (A)** and **Reason (R)** are correct and **Reason (R)** is the correct explanation of **Assertion (A)**.

(3) Both **Assertion (A)** and **Reason (R)** are correct but **Reason (R)** is not the correct explanation of **Assertion (A)**.

(4) **Assertion (A)** is correct but **Reason (R)** is not correct.

17. Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A): All vertebrates are chordates but all chordates are not vertebrates.

Reason (R): Notochord is replaced by vertebral column in the adult vertebrates.

In the light of the above statements, choose the **most** appropriate answer from the option given below:

(1) Both **Assertion (A)** and **Reason (R)** are correct and **Reason (R)** is the correct explanation of **Assertion (A)**.

(2) Both **Assertion (A)** and **Reason (R)** are correct but **Reason (R)** is not the correct explanation of **Assertion (A)**.

(3) **Assertion (A)** is correct but **Reason (R)** is not correct

(4) **Assertion (A)** is not correct but **Reason (R)** is correct

18. Which of the following statements are **true /false**?

I. Thyrocalcitonin regulates blood glucose levels.

II. Oxytocin stimulates contractions of uterine muscles during birth.

III. Grave's disease is caused by malfunctioning of the thyroid gland.

IV. ADH stimulates the absorption of water and increased urine production.

(1) I and III are true; II and IV are false

(2) I and II are true; III and IV are false

(3) I and IV are false; II and III are true

(4) I, II and III are true; IV only false

19. _____ stimulates the synthesis and secretion of steroid hormones from the _____.

(1) CRH, Adrenal Medulla

(2) Gonadotropins, Gonads

(3) CRH, Adrenal Cortex

(4) ACTH, Adrenal medulla

20. **Assertion (A):** Solubility of gases affect the rate of diffusion.

Reason (R): A gas having high solubility, diffuses at a faster rate than the gas having lower solubility.

Choose the appropriate option:

(1) (A) is correct but (R) is not correct

(2) (A) is not correct but (R) is correct

(3) Both (A) and (R) are correct and (R) is the correct explanation of (A)

(4) Both (A) and (R) are correct but (R) is not the correct explanation of (A)

21. What will be the pO_2 and pCO_2 in the atmospheric air as compared to those in alveolar air?

(1) pO_2 higher, pCO_2 lesser

(2) pO_2 lesser, pCO_2 higher

(3) pO_2 higher, pCO_2 higher

(4) pO_2 lesser, pCO_2 lesser

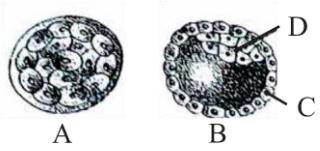
22. The central part of thick filament, not overlapped by thin filament when a muscle is in relaxed state is called

(1) A- zone (2) I- zone

(3) H- zone (4) O- zone

23. **Statement I:** Menstrual flow lasts for 3-4 days.
Statement II: Menstruation usually occurs about 20 days after ovulation.
Choose the **correct** option.
(1) Statement I is correct but statement II is incorrect
(2) Statement I is incorrect but statement II is correct
(3) Both statement I and II are correct
(4) Both statement I and II are incorrect

24. Identify the stage A and B and what are the correct labellings of C and D?



Choose the **correct** option.

	A	B	C	D
(1)	Morula	Blastocyst	Follicular cells	Inner cell mass
(2)	Morula	Blastocyst	Embryo	Tropho blast
(3)	Morula	Blastocyst	Trophoblast	Inner cell mass
(4)	Blastocyst	Morula	Trophoblast	Inner cell mass

25. Sertoli cells are found in
(1) Pancreas and secrete cholecystokinin
(2) Ovaries and secrete progesterone
(3) Adrenal cortex and secrete adrenaline
(4) Seminiferous tubules and provide nutrition to germ cells

26. Which of the following is the most effective method of birth control which prevents ovulation?
(1) CuT (2) Oral contraceptives
(3) MTP (4) Use of condoms

27. Which of the following is **not true** for an ideal contraceptive?
(1) User friendly
(2) Negligible failure rate
(3) Irreversible
(4) None or least side effects

28. Lamark's theory was based on the hypothesis of
(1) Use and disuse of organs
(2) Inheritance of acquired characters
(3) Both (1) and (2)
(4) None of these

29. Due to discovery of which of the following in 1980s, the evolution was termed as RNA world?
(1) m-RNA, t-RNA, r-RNA synthesis proteins
(2) In some viruses, RNA is genetic material
(3) RNA has enzymatic property
(4) RNA is not found in all cells

30. **Assertion (A):** Restriction digestion is a process of cutting DNA by restriction enzyme
Reason (R): DNA ligase joins two DNAs.
Choose the appropriate option:
(1) Both (A) and (R) are true and reasons is the correct explanation of (A)
(2) Both (A) and (R) are true but (R) is not the correct explanation of (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

31. Method involving entry of high velocity gold microparticles coated with DNA into plant cells
(1) Protoplast function
(2) Transfection
(3) Biolistic
(4) Magic bullet action

32. **Statement I:** *Brassica napus* seeds accumulate animal protein hirudin.
Statement II: In mature insulin 'C' chain is present.
(1) Statement I is correct but statement II is incorrect
(2) Statement I is incorrect but statement II is correct
(3) Both statement I and statement II are correct
(4) Both statement I and statement II are incorrect

33. The site where lymphocytes interact with antigens and proliferate to become effector cells are
(1) Spleen and lymph nodes
(2) Bone marrow and thymus
(3) Peyer's patches and tonsils
(4) Both (1) and (3)

34. Read the following statements carefully.

(I) Cancer causing viruses have genes called viral oncogenes.

(II) Malignant tumors remain confined to their original location.

(III) Cancer cells do not exhibit contact inhibition.

(IV) X-rays and UV rays are not potent carcinogens.

(V) Cancer detection is based on biopsy.

Which of the above statements are **not correct** regarding cancer?

(1) (III) and (V)

(2) (II) and (IV)

(3) (I), (III) and (V)

(4) (II), (IV) and (V)

35. Match the parts given in Column-I to their characteristic features in Column-II and choose the **correct** option from the codes given below.

Column-I		**Column-II**	
(A)	Penis	(I)	Loose fold of skin
(B)	Glans penis	(II)	Male external genitalia
(C)	Foreskin	(III)	External opening urethra
(D)	Urethral meatus	(IV)	Enlarged end of penis

(1) (A) → II, (B) → IV, (C) → I, (D) → III

(2) (A) → III, (B) → IV, (C) → I, (D) → II

(3) (A) → II, (B) → IV, (C) → III, (D) → I

(4) (A) → IV, (B) → III, (C) → II, (D) → I

SECTION B

36. Match the items given in column I with those in column II and select the **correct** option given below.

Column I		**Column II**	
I.	Glycosuria	A.	Accumulation of uric acid in joints
II.	Gout	B.	Mass of crystallised salts within the kidney
III.	Renalcalculi	C.	Inflammation of glomeruli
IV.	Glomerular nephritis	D.	Presence of glucose in urine

	I	**II**	**III**	**IV**
(1)	C	B	D	A
(2)	A	B	C	D
(3)	D	A	B	C
(4)	B	C	A	D

37. **Statement A:** The neural system is composed of highly specialised cells called neurons that can detect stimuli.

Statement B: The neural system is composed of highly specialised cells called neurons that can transmit stimuli.

(1) Statement A is correct

(2) Statement B is correct

(3) Statement A and B are correct

(4) Statement A and B are incorrect

38. Blood carries the CO_2 in three forms. The **correct** percentages of CO_2 in these forms are:

	As carbamino-hemoglobin RBC	**As bicarbonates**	**Dissolved form in plasma**
(1)	20–25%	70%	7%
(2)	70%	20-25%	7%
(3)	20-25%	7%	70%
(4)	7%	20-25%	70%

39. If over secretion of growth hormone occurs after puberty, then individual suffers from

(1) Gigantism

(2) Acromegaly

(3) Pitutary dwarfism

(4) All of these

40. **Statement I:** First mammals on earth were like shrews.

Statement II: *Dryopithecus* were more ape-like and *Ramapithecus* were more man-like primate.

Choose the **correct** option.

(1) Statement I is correct but statement II is incorrect

(2) Statement I is incorrect but statement II is correct

(3) Both statement I and II are correct

(4) Both statement I and II are incorrect

41. Autoimmunity is caused due to the

(A) ability of immune cells to discriminate between self-cells from non-self-cells.

(B) inability of immune cells in damaging self-cells representing foreign antigens.

(C) inability of immune cells in distinguishing self-cells from non-self-cells.

(D) ability of immune cells to damage self-cells.

(1) (A) and (B) only

(2) (B) and (C) only

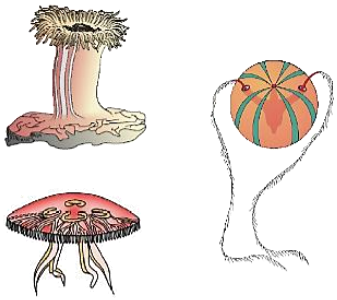
(3) (C) and (D) only

(4) (A) and (D) only

42. Primary structure of a protein relates to
(1) α-helical folding of a polypeptide
(2) Association of two polypeptides
(3) The sequence of amino acids
(4) β-pleated sheet folding of a polypeptide

43. Labia majora in human is homologous to
(1) Clitoris (2) Hymen
(3) Scrotum (4) Testis

44. Diagrams of some animals are given below. Identify the common character in them.



(1) Presence of cnidoblasts
(2) Presence of ciliary comb plates
(3) Extracellular and intracellular digestion
(4) Bioluminescence

45. Which of the following arthropods are harmful?
(A) *Culex* (B) *Bombyx*
(C) *Apis* (D) *Locusta*
(1) A and B (2) B and C
(3) B and D (4) A and D

46. Restriction endonuclease cuts
(1) dsDNA
(2) ssDNA
(3) Single strands of dsDNA
(4) Both (1) and (2)

47. Which of the following is used as a bioweapon?
(1) *Bacillus subtilis*
(2) *Bacillus licheniformis*
(3) *Bacillus thuringiensis*
(4) *Bacillus anthracis*

48. Which of the following groups of contraceptives are included under barrier methods?
(1) Condom, vaults, IUDs, cervical caps
(2) IUDs, diaphragm, periodic abstinence, injections
(3) Condom, diaphragm, cervical caps, vaults
(4) Surgical methods, oral contraceptives, cervical caps, vaults

49. Striations in the striated muscles are due to
(1) Absence of myofilaments
(2) Presence of myofilaments
(3) Specialised arrangement of myofilaments
(4) Projections of myosin

50. First polar body is formed during the formation of _____ and completion of _____meiotic division.
(1) Primary oocyte, second
(2) Secondary oocyte, first
(3) Secondary spermatocyte, second
(4) Primary spermatocyte, first

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ZOOLOGY

ANSWER KEY

1.	(3)	26.	(2)
2.	(4)	27.	(3)
3.	(4)	28.	(3)
4.	(1)	29.	(3)
5.	(1)	30.	(2)
6.	(1)	31.	(3)
7.	(1)	32.	(1)
8.	(1)	33.	(4)
9.	(1)	34.	(2)
10.	(4)	35.	(1)
11.	(3)	36.	(3)
12.	(4)	37.	(3)
13.	(1)	38.	(1)
14.	(1)	39.	(2)
15.	(2)	40.	(3)
16.	(2)	41.	(3)
17.	(1)	42.	(3)
18.	(3)	43.	(3)
19.	(2)	44.	(3)
20.	(3)	45.	(4)
21.	(1)	46.	(1)
22.	(3)	47.	(4)
23.	(1)	48.	(3)
24.	(3)	49.	(3)
25.	(4)	50.	(2)

HINTS AND SOLUTION

1. **(3)**
Transitional epithelium is found in renal pelvis, ureters and urinary bladder.

2. **(4)**
90-92 % of plasma is water and proteins contribute 6-8% of plasma.

3. **(4)**
- Tight junctions provide a barrier which prevents leakage of fluid across epithelial cells.
- Adherens junctions aid to cement adjacent cells to form a sheet.
- Gap junctions provide cytoplasmic channels to facilitate communication between adjacent cells.
- Synaptic junctions help in transmission of information through chemicals.

4. **(1)**
- Fibrinogens are needed for clotting or coagulation of blood.
- Albumins help in osmotic balance.

5. **(1)**
Saltation - De vries
Chemical evolution -Oparin and Haldane
Reproductive fitness - Darwin
Life come from pre existing life -Pasteur

6. **(1)**
-Cellular barriers include NK cells, macrophages (monocytes) and neutrophils (PMNL).
-Cytokine barriers include interferons.
-Physical barriers include mucus membranes and skin.
-Physiological barriers include HCl in gastric juice, saliva and tears etc.

7. **(1)**
ADH promotes water reabsorption in the DCT and collecting duct, resulting in hypertonic urine.

8. **(1)**
Aschelminthes are pseudocoelomates.
Platyhelminthes are acoelomate and Annelida and Arthropoda are coelomates.

9. **(1)**
Bulbourethral gland, also called Cowper's gland, either of two pea-shaped glands in the male are located beneath the prostate gland at the beginning of the internal portion of the penis. This helps in lubrication of penis.

10. **(4)**
Heart is ventral in position in chordates.

11. **(3)**
Ichthyophis is a limbless amphibia.

12. **(4)**
The factor affecting enzyme activity in given graph is substrate concentration.

13. **(1)**

14. **(1)**
Nearly all of the essential nutrients and 70-80% of electrolytes and water are reabsorbed in PCT segment of nephron.

15. **(2)**
When a Neuron is not conducting any impulse i.e, resting, the axonal membrane comparatively more to potassium ions (K^+) and nearly impermeable to sodium (Na^+) ions.

16. **(2)**
When restriction enzymes cut the strand of DNA a little away from the centre of the palindrome sites, but between the same two bases on the opposite strands, then single stranded portions are left at the ends. These overhanging stretches on each strand are called sticky ends.

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17. **(1)** All vertebrates are chordates but all chordates are not vertebrates because notochord is replaced by vertebral column in the adult vertebrates.

18. **(3)**
Thyrocalcitonin regulate calcium level. ADH stimulates the absorption of water and thereby decreased urine production.

19. (2)
Gonadotropins stimulates the synthesis and secretion of steroid hormones from the gonads.

20. (3)
Solubility of gases affect the rate of diffusion. Solubility of gas $\propto$ rate of diffusion.

21. (1)
pO_2 is higher in atmosphere than alveolar air.

22. (3)
Central part of thick filament, not overlapped by thin filament when a muscle is in relaxed state is called H-zone.

23. (1)
Menstruation flow last for 3-4 days and usually occur about 14-days after ovulation.

24. (3)
In the given diagram
Stage A = Morula
Stage B = Blastocyst
Labelling C = Trophoblast
Labelling D = Inner cell mass

25. (4)
Sertoli cells are found in seminiferous tubules and provide nutrition to germ cells.

26. (2)
Oral contraceptive is the most effective method of birth control which prevent ovulation.

27. (3)
Ideal contraceptive should be reversible.

28. (3)
Lamark's theory was based on the hypothesis of used an disuse of organs and inheritance of acquired character.

29. (3)
Due to the discovery of RNA has enzymatic property in 1980s. The evolution was termed as RNA world.

30. (2)
Restriction digestion is a process of cutting DNA by restriction enzyme. DNA ligase joins two DNAs.

31. (3)
Method involving entry of high velocity gold microparticles coated with DNA into plant cells is called biolistic.

32. (1)
Brassica napus seeds accumulate animal protein hirudin. In mature insulin C-chain is absent.

33. (4)
The secondary lymphoid organs provide the sites for interaction of lymphocytes with the antigen, which then proliferate to become effector cells.

34. (2)
Malignant tumors do not remain confined to their original location. X-rays and UV rays are potent carcinogens.

35. (1)

Column-I		**Column-II**	
(A)	Penis	(I)	Male external genitalia
(B)	Glans penis	(II)	Enlarged end of penis
(C)	Foreskin	(III)	Loose fold of skin
(D)	Urethral meatus	(IV)	External opening urethra

36. (3)
- Glycosuria denotes presence of glucose in the urine. This is observed when blood glucose level rises above 180 mg/100 ml of blood, this.
  is called renal threshold value for glucose.
- Gout is due to deposition of uric acid crystals in the joint.
- Renal calculi are precipitates of calcium phosphate produced in the pelvis of the kidney.
- Glomerular nephritis is the inflammatory condition of glomerulus characterised by proteinuria and haematuria.

37. (3)
The neural system is composed of highly specialised cells called neurons that can detect and transmit stimuli.

38. **(1)**
CO_2 is carried by haemoglobin as carbamino-haemoglobin (about 20-25 per cent), as bicarbonates 70% and 7% in dissolved form.

39. **(2)**
If over secretion of growth hormone occur after puberty than individual suffers from acromegaly.

40. **(3)**
First mammals on earth were like shrews. *Dryopithecus* were more ape-like and *Ramapithecus* were more man like primate.

41. **(3)**
Autoimmunity is caused due to the inability of immune cells in distinguishing between self-cells from non-self and ability of self-cells to damage self-cells.

42. **(3)**
Textual based question

43. **(3)**
Labia majora is homologous to scrotum. Clitoris is homologous to male penis. Testis are homologous to ovary.

44. **(3)**
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45. **(4)**
Culex and *Locusta* are harmful insects.

46. **(1)**
Restriction endonuclease cut dsDNA.

47. **(4)**
Bacillus anthracis is used as bioweapons.

48. **(3)**
In case of condom, diaphragm, cervical caps and vaults, ovum and sperms are prevented from physically meeting.

49. **(3)**
Striated muscle is characterised by the presence of light and dark bands of protein.

50. **(2)**
Primary oocyte within the tertiary follicles grows in size and complete its first meiotic division. It results in a large haploid secondary oocyte and a tiny first polar body.