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ASSERTION AND REASON

Biology for NEET UG

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This edition includes

- Chapter-wise coverage
- NCERT based questions
- 800+ questions for practice
- Useful for NEET UG & other medical entrance exams

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Biology

1. The Living World

1. **Assertion (A):** Growth can not be taken as defining property of living organisms

Reason (R): Non living objects also grow if we take increase in body mass as a criterion for growth.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

2. **Assertion (A):** In unicellular organisms like bacteria, unicellular algae or Amoeba, reproduction is synonymous with growth.

Reason (R): Reproduction is one of the defining characteristic of living organisms.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

3. **Assertion (A):** All organisms, from prokaryotes to most complex eukaryotes can sense and respond to environmental cues.

Reason (R): Consciousness is the most defining property of living beings.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

4. **Assertion (A):** All the living objects can not exhibit all living properties.

Reason (R): All living phenomenon are due to underlying interactions.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

5. **Assertion (A):** Living organisms are self replication, evolving and self regulating interactive system capable of responding to external stimuli.

Reason (R): Living beings show hierarchy of organizational complexity at all levels.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

6. **Assertion (A):** For plants scientific names are based on agreed principles and criteria which are provided in ICNB.

Reason (R): The scientific names ensure that each organism has only one name, but this name can be repeated for other organism of same kingdom.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

7. **Assertion (A):** Binomial naming system given by Carolus Linnaeus is being practiced by biologists all over the world.

Reason (R): This naming system using a two word format was found convenient.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

8. **Assertion (A):** Binomial names are latinized or derived from latin irrespective of their origin.

Reason (R): Latin is a dead language, so used by scholars.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

9. **Assertion (A):** Branch of biology which deals with knowing more about different kind of organisms and their diversities and relationship among them is known as systematics.
Reason (R): The scope of systematics can not enlarge to include identification, nomenclature and classification.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10. **Assertion (A):** Species is the most fundamental unit of taxonomy.
Reason (R): In taxonomic hierarchy, species rank shows maximum common features.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. **Assertion (A):** Genera are aggregates of closely related species.
Reason (R): Genus comprises a group of related species which has more characters in common in comparison to species of other genera.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. **Assertion (A):** Families are characterized on the basis of both vegetative and reproductive features of species.
Reason (R): Members of family can show morphological similarities, but unexceptionally none of the genera of same family can interbreed with each other.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

13. **Assertion (A):** In higher category there is great difficulty of determining the relationship to other taxa at the same level.
Reason (R): In higher taxa there are less characteristics that the members within the taxa share.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

14. **Assertion (A):** Herbaria can not serve as quick reference system in taxonomical studies.
Reason (R): Herbaria do not help in identification and classifications.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

15. **Assertion (A):** Cryptogams do not reproduce sexually.
Reason (R): Flowers are indistinct in cryptogams.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

16. **Assertion (A):** Classification of Linnaeus is artificial.
Reason (R): It is based on artificial characters.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

17. **Assertion (A):** The species is a group of interbreeding individuals reproductively isolated from the other species populations.

Reason (R): Prokaryotes cannot be kept under different species on the basis of reproductive isolation.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

18. **Assertion (A):** Species are static units in classification.

Reason (R): Species do not change with time.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

19. **Assertion (A):** Taxonomic Keys are device used by biologists for identifying unknown organisms.

Reason (R): Keys are presented with a series of choices about the characteristics of the unknown organisms; by making the correct choice at each step of the key, the user is ultimately led to the identity of a specimen.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

20. **Assertion (A):** In an organism anabolism and catabolism take place simultaneously.

Reason (R): Senescence occurs when there is an increase in the rate of anabolism with respect to catabolism.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

21. **Assertion (A):** Reproduction cannot be an all-exclusive defining characteristic of living organisms but no nonliving object is capable of reproducing or replicating by itself.

Reason (R): All living organisms do not reproduce.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

22. **Assertion (A):** Biological concept of species is most accepted explanation about definition of species.

REASON (R): Biological concept of species explains the diversity of origin of species.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

23. **Assertion (A):** Most of the species are identified on the basis biological species concept.

Reason (R): Interbreeding can be practically used as routine criterion for identification.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

24. **Assertion (A):** Before assigning a biological name to a living organism, it is essential to identify the organism correctly.

Reason (R): Nomenclature or naming is only possible when the organism is described correctly and we know to what organism the name is attached to.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

25. **Assertion (A):** Higher the taxonomic category, greater is the difficulty of determining the relationship to other taxa at the same level.

Reason (R): The higher taxonomic categories are more exclusive and the lower taxonomic categories are more inclusive in nature.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

26. **Assertion (A):** Reproduction cannot be an all-inclusive defining characteristic of living organisms.

Reason (R): No non-living object is capable of reproducing or replicating by itself.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

27. **Assertion (A):** Higher the taxonomic category, greater is the difficulty of determining the relationship to other taxa at the same level.

Reason (R): Lower the taxa, more are the characteristics that the members within the taxon share.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

2. Biological Classification

1. **Assertion (A):** Two kingdom classification used for a long time was inadequate.

Reason (R): This system did not distinguish between the eukaryotes and prokaryotes, unicellular and multicellular.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

2. **Assertion (A):** In Earlier classifications bacteria, blue green algae, fungi, mosses, ferns, gymnosperms and angiosperms were included together under plants.

Reason (R): All the members possess cell wall over plasma membrane.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

3. **Assertion (A):** Classification systems have undergone several changes over a period of time.

Reason (R): This happened, because the criteria for classifications get changed gradually.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

4. **Assertion (A):** Bacteria, the sole members of kingdom monera, are the most abundant micro-organisms.

Reason (R): Bacteria can tolerate extreme conditions, so they are found everywhere.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

5. **Assertion (A):** Cyanobacteria are photosynthetic autotrophs similar to higher plants.

Reason (R): Cyanobacteria have chlorophyll - a and Rubisco.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

6. **Assertion (A):** Heterocyst are specialized cells of blue green algae for Nitrogen fixation.

Reason (R): In Heterocyst cells oxygen depleted conditions can be created, which is essential for Nitrogenase functioning.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

7. **Assertion (A):** Heterotrophic bacteria are the most abundant bacteria they have a significant impact on human affairs.

Reason (R): Heterotrophic bacteria are helpful in making curd, production of Antibiotics and fixation of nitrogen.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

8. **Assertion (A):** Beside spore formation and binary fission a sort of sexual reproduction is also observed in bacteria, but it is not a typical sexual reproduction.

Reason (R): In such type of reproduction there is no gamete formation and fusion.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

9. **Assertion (A):** Members of protista are eukaryotes.

Reason (R): Protistial cell body does not contain a well defined nucleus and other membrane bounded cell organelles.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

10. **Assertion (A):** Most of the dinoflagellates show heterokont flagellation.

Reason (R): Both of the flagella arise from different levels In them.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

11. **Assertion (A):** Euglenoids show flexible life style.

Reason (R): In presence of sunlight they are photosynthetic while in sunlight deprived conditions they behave like heterotrophs.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

12. **Assertion (A):** Slime moulds are extremely resistant and survive for many years.

Reason (R): Slime moulds possess branched phospholipids and thermostable enzymes.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

13. **Assertion (A):** Fungi prefer to grow in cold and humid areas.

Reason (R): Low temperature favours the metabolic activities.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

14. **Assertion (A):** In Ascomycetes and Basidiomycetes well distinct Dikaryophase present during sexual life.
Reason (R): During sexual reproduction of Ascomycetes and Basidiomycetes plasmogamy is immediately followed by karyogamy.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

15. **Assertion (A):** Viruses are obligate intracellular parasite.
Reason (R): Outside the cells virus survive as non living inert crystalline structure.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

16. **Assertion (A):** Lichens are symbiotic associations.
Reason (R): Lichens are very good pollution indicators.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

17. **Assertion (A):** Archaebacteria are most resistant to adverse environmental conditions
Reason (R): In archaebacteria, cell wall and cell membrane are highly complex.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

18. **Assertion (A):** Progressive reduction of sexual reproduction is found in fungi
Reason (R): Higher fungi do not produce sex organs and gametes
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

19. **Assertion (A):** Dikaryon is observed in Ascomycetes and Basidiomycetes.
Reason (R): In some fungi karyogamy is delayed after plasmogamy.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

20. **Assertion (A):** Nitrogenase is sensitive to oxygen hence an anaerobic condition is maintained for efficient nitrogen fixation.
Reason (R): High energy inputs for the cell to function demands high rates of aerobic respiration in the Kreb's cycle and hence behaves as an oxygen scavenger
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

21. **Assertion (A):** Sex organs in fungi are unicellular and nonjacketed.
Reason (R): There is no embryo formation in the life cycle of fungi.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

22. **Assertion (A):** Amoeba and Paramoecium are included in Kingdom Protista and not in Kingdom Animalia.
Reason (R): Unlike animals, a cell wall is present in these organisms.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

23. **Assertion (A):** The body of Euglenoids is flexible.
Reason (R): The cell wall in Euglenoids is cellulosic.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

24. **Assertion (A):** The artificial systems used for classification of living organisms are not very acceptable to taxonomists.
Reason (R): The artificial systems give more weightage to vegetative characteristics and no weightage to sexual characteristics and the sexual characteristics are easily affected by environment.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

25. **Assertion (A):** Paramoecium and Amoeba, which were earlier placed in the animal kingdom which lack cell wall, are placed under Kingdom Protista in Whittaker's Classification.
Reason (R): The unicellular eukaryotic organisms are placed in Kingdom Protista in Whittaker's Classification.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

26. **Assertion (A):** Lichens are very good pollution indicators.
Reason (R): They grow profusely in polluted areas.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

27. **Assertion (A):** The cyanobacteria that are also referred to as blue green algae are not 'algae' any more.
Reason (R): The cyanobacteria are photosynthetic autotrophs.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

28. **Assertion (A):** Alternaria, Colletotrichum and Trichoderma are kept in the fungal class- Deuteromycetes.
Reason (R): Asexual and vegetative phases in the life cycle of these fungi are not known. In the light of the above statements choose the correct answer from the options given below:
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

3. Plant Kingdom

1. **Assertion (A):** Cyanobacteria that are also referred as blue green algae, now not involved in 'algae', a group of kingdom Plantae.
Reason (R): Plantae is the group of Eukaryotic multi-cellular organisms, while cyanobacteria are prokaryotes.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

2. **Assertion (A):** Natural classifications are more accurate than artificial classifications
Reason (R): They are based on natural affinities among organisms and consider only external feature not internal features.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

3. **Assertion (A):** In numerical taxonomy each character is given equal importance.
Reason (R): It is quantitative arrangement based on computational and statistical analysis of number and codes of the characters.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

4. **Assertion (A):** Sexual reproduction of Spirogyra is isogamous type.
Reason (R): Both of the fusing gametes of Spirogyra are non-flagellated and similar in size.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

5. **Assertion (A):** Algae are of paramount importance in aquatic ecosystem.
Reason (R): Their photosynthetic ability is the basis of food cycle for all aquatic animals.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

6. **Assertion (A):** Algae can bridge the gap between demand and supply of proteinaceous diet, worldwide.
Reason (R): Chlorella and Spirulina are unicellular proteinaceous food supplement.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

7. **Assertion (A):** Algae are divided into three main classes, based on only cell wall composition.
Reason (R): Among members of algae composition of cell wall is extremely variable.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

8. **Assertion (A):** Members of phaeophyceae or brown algae group show variation of color from olive green to various shades of brown color.
Reason (R): In phaeophycean member amount of xanthophyll and fucoxanthin is variable.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

9. **Assertion (A):** Water is essential for completion of life cycle of bryophytes.
Reason (R): Water helps in activation of enzymes to favour metabolism of cells.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10. **Assertion (A):** Bryophytes are of great ecological importance.
Reason (R): Bryophytes help in colonization (succession) on bare rocks/soil.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. **Assertion (A):** Bryophytes play great role in providing ecological services.
Reason (R): Bryophytes help in making of soil and prevention of soil erosion as well.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. **Assertion (A):** Mosses are more advanced group of Bryophytes.
Reason (R): Gametophyte of mosses have rhizoids stem like and leaf like structure.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

13. **Assertion (A):** Pteridophytes are successful land plants.
Reason (R): Pteridophytes possess vascular tissue and roots.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

14. **Assertion (A):** Gametophyte of homosporous pteridophyte does not depend on sporophyte body.
Reason (R): In homosporous pteridophytes there is *ex situ* or exosporic spore germination.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

15. **Assertion (A):** Seed habit was originated in pteridophytes, which became an important step in evolution.
Reason (R): Heterospory was first time developed in pteridophytes.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

16. **Assertion (A):** In gymnosperms seeds are naked.
Reason (R): In gymnosperms embryo is not covered with their protective coverings
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

17. **Assertion (A):** In gymnosperms the seeds that develop post fertilization are naked.

Reason (R): In gymnosperms ovules are not enclosed by any ovary wall.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

18. **Assertion (A):** Gymnosperms are first completely successful land plants.

Reason (R): In gymnosperms secondary growth is present.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

19. **Assertion (A):** Male gametophytic generation of gymnosperms is highly reduced.

Reason (R): In gymnosperms male gametophyte is to be travelled up to female gametophyte.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

20. **Assertion (A):** Unlike gymnosperms, in angiosperms seeds are not naked.

Reason (R): In angiosperms ovules are developed in specialized structures called flower.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

21. **Assertion (A):** Embryo sac of Angiosperms represents female gametophytic generation.

Reason (R): Embryo sac arise from megaspore and spore is the first cell of gametophytic generation.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

22. **Assertion (A):** Plants have ability for the formation of different plant bodies-haploid and diploid.

Reason (R): In plants both haploid and diploid cells can divide by mitosis.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

23. **Assertion (A):** Generally thallophytes show haplontic life cycle.

Reason (R): In thallophytes generally one phase that is haploid dominate.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

24. **Assertion (A):** All seed bearing plants follow diplontic life cycle.

Reason (R): In seed bearing plants both gametophytic and sporophytic generation dominate in form of well developed plant body.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

25. **Assertion (A):** Unlike other algae, Fucus shows a diplontic life cycle.

Reason (R): In Fucus gametophytic generation is reduced and short living.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

26. **Assertion (A):** Bryophyta are termed as amphibians of plant kingdom

Reason (R): Bryophyta are first land plants but depend on water for fertilization.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

27. **Assertion (A):** Sporophyte of pteridophytes may be monoecious or dioecious

Reason (R): Sporophyte of pteridophytes bear sex organ.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

28. **Assertion (A):** Flowering Plants have independent sporophytic generation which represents the main plant body.

Reason (R): Flowering plants perform meiosis during microspore and megaspore spore formation which gives rise to male and female gametophytes respectively.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

29. **Assertion (A):** In Angiosperm, archegonia is present in embryosac.

Reason (R): One male gamete fertilize egg of embryosac & another fertilize antipodal nucleus.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

30. **Assertion (A):** Conservative characters are more useful in classification.

Reason (R): These characters do not change rapidly during evolution. therefore, their similarities show relationships among organisms.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

31. **Assertion (A):** Bryophytes are called amphibians of the plant kingdom.

Reason (R): Bryophytes play an important role in plant succession on bare rocks.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

32. **Assertion (A):** Diatoms have left behind large amount of cell wall deposits in their habitat.

Reason (R): Diatoms are the chief 'producers' in the oceans.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

33. **Assertion (A):** Mosses reduce the impact of falling rain and prevent soil erosion.

Reason (R): Mosses form dense mats on the soil.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

34. **Assertion (A):** Peat moss is used as packing material for trans-shipment of living material.

Reason (R): Peat moss has a good capacity to hold water.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

4. Animal Kingdom

1. **Assertion (A):** The protozoans are belived to be primitive relatives of animals.

Reason (R): Protozoans are heterotrophs and live as predators or parasites.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

2. **Assertion (A):** Coelenterates have tissue grade of organisation.

Reason (R): In coelenterates the cells performing the same function are arranged into group.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

3. **Assertion (A):** Poriferans shows internal fertilization with metamorphic development.

Reason (R): Larval form of sponges are similar to their adult.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

4. **Assertion (A):** Polyps produce medusae sexually and medusae form the polyps asexually.

Reason (R): Polyps and medusae are the common feature of different group of cnidarians.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

5. **Assertion (A):** Sea walnuts are exclusively marine radially symmetrical, diploblastic organisms with tissue level of organisation.

Reason (R): It having efficient osmoregulatory organ which made them capable to survive in marine habitat.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

6. **Assertion (A):** Members of phylum platyhelminthes are also called flat worms.

Reason (R): It have dorso-ventrally flattened body.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

7. **Assertion (A):** Hooks and suckers are present in the parasitic form of flat worms.

Reason (R): It helps in absorbing nutrients from the host body.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

8. **Assertion (A):** The members of phylum-Aschelminthes are called round worms.

Reason (R): The body of the Aschelminthes is circular in cross-section.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

9. **Assertion (A):** Radulla is a masticatory organ.

Reason (R): It is calcareous in nature.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

10. **Assertion (A):** Echinodermates placed more closure to the chordats.

Reason (R): Echinodermates are enterocoelomic and deuterostomate with mesodermal endoskeleton.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

11. **Assertion (A):** Animal belonging to phylum chordata are fundamentally characterized by the presence of notochord, a dorsal hollow nerve cord and paired pharyngeal gill stits.

Reason (R): These are triploblastic and pseudocoelomate animals.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

12. **Assertion (A):** Only pisces possess a post anal tail and a closed circulatory system.

Reason (R): Pisces are aquatic with having no balancing organ.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

13. **Assertion (A):** Teeth in vertebrates are modified placoid scales which are backwardly directed.

Reason (R): All vertebrates having true jaw.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

14. **Assertion (A):** *Scoliodon* (Dog fish) have to swim constantly to avoid sinking.

Reason (R): It does not have air bladder.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

15. **Assertion (A):** *Pristis* is an example of cold blooded animal.

Reason (R): It does not have capability to regulate their body temperature.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

16. **Assertion (A):** Amphibians are generally oviparous and with metamorphic development.

Reason (R): Generally larval forms are herbivores and adults are carnivores.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

17. **Assertion (A):** Snakes and lizards shed their scales as skin cast.

Reason (R): They have the capability of great regeneration.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

18. **Assertion (A):** The body of reptiles is covered by dry and cornified skin, epidermal scales or scutes.

Reason (R): Reptiles are true terrestrial vertebrate.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

19. **Assertion (A):** Air sacs in Aves are connected to lungs and supplement in respiration.

Reason (R): It increases the area of gaseous exchange.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

20. **Assertion (A):** Endoskeleton of *sturthio* is fully ossified.

Reason (R): It is flightless birds.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

21. **Assertion (A):** Mostly mammals are viviparous.

Reason (R): Mammals having milk producing glands.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

22. **Assertion (A):** Air for respiration enters the insect body through the spiracles.

Reason (R): Haemolymph in insect has no role in transportation of gases.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

23. **Assertion (A):** Notochord is stiff and flexible rod like tissue lying ventral to the nerve cord along the mid dorsal line in hemichordates.

Reason (R): It is ectodermal in origin.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

24. **Assertion (A):** In porifera archaeocytes are totipotent cells

Reason (R): They can give rise to all other types of the cells in poriferans.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

25. **Assertion (A): Calotes** is capable to change its body colour.

Reason (R): Calotes shows pedogeny.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

26. **Assertion (A):** Most of the animals of hirudinea are sanguivorous

Reason (R): They are only depend upon blood of human.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

27. **Assertion (A):** Alimentary canal is absent in *Taenia solium*.

Reason (R): *Taenia solium* is an endoparasite.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

28. **Assertion (A):** All triploblastic animals are not coelomate.

Reason (R): Animal with incomplete type of digestive tract are diploblastic.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

29. **Assertion (A):** Amongs arthropods, wings are present only in the members of class insecta.

Reason (R): Wings may or may not present in the class insecta.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

30. **Assertion (A):** Water vascular system plays major role in locomotion of echinoderm.

Reason (R): Hydraulic pressure of fluid and contraction of muscle of Tube feet make possible movement of echinoderm.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

31. **Assertion (A):** Eggs of reptile & aves contain large amount of yolk.

Reason (R): Cleidoic eggs are shelled eggs best suited for terrestrial adaptation.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

32. **Assertion (A):** Credit of acute & telescopic vision in birds can be given to preen gland present in their eyes.

Reason (R): Preen gland provides nutrition to eye balls of aves except kiwi.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

33. **Assertion (A):** Bats and whales are classified as mammals.

Reason (R): Bats and whales have four chambered heart.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

34. **Assertion (A):** Tapworm, roundworm and pinworm are endoparasite of human intestine.

Reason (R): Inproperly cooked food is the source of all intestinal infection.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

35. **Assertion (A):** The duck-billed platypus & spiny ant eater, both are egg-laying animal yet they are group under mammals.

Reason (R): Both of them have seven cervical vertebrae and 12 pairs of cranical nerves.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

36. **Assertion (A):** Fertilization is internal and eggs are polylecithal in reptiles.

Reason (R): Reptiles are amniotes and metamorphosis is absent in them.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

37. **Assertion (A):** Contractile vacuole is absent in sporozoans.

Reason (R): All the sporozoans are endoparasite.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

38. **Assertion (A):** A soft and spongy layer of skin forms a mantle over the visceral hump.

Reason (R): The space between calcareous shell and the mantle is called the mantle cavity

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

39. **Assertion (A):** Housefly is the best example of holometabolous type of development.

Reason (R): Incomplete type of metamorphosis, takes place in housefly.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

40. **Assertion (A):** Primates considered as most intelligent mammals.

Reason (R): Diaphragm is found in all mammals.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

41. **Assertion (A):** Jellyfish are softbodied, free-swimming aquatic animals with a gelatinous umbrella-shaped bell and trailing tentacles.

Reason (R): Most jellyfish do not have specialized digestive, osmoregulatory, central nervous, respiratory, or circulatory systems.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

42. **Assertion (A):** Much like humans, annelids have a closed circulatory system.

Reason (R): The blood circulates through a network of blood vessels.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

43. **Assertion (A):** When any plane passing through the central axis of the body divides the organism into two identical halves, then the organism is said to be radially symmetrical.

Reason (R): Only diploblastic animals can have radial symmetry.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

44. **Assertion (A):** Body surface of Annelids is distinctly marked out into segments or metameres.

Reason (R): Metameres are due to presence of longitudinal and circular muscles which help in locomotion.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

45. **Assertion (A):** Roundworms may be free-living, aquatic and terrestrial or parasitic in plants and animals.

Reason (R): Roundworms have complete digestive tract with muscular pharynx.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

46. **Assertion (A):** In sponges fertilization is always internal and development is always indirect.

Reason (R): In sponges fertilization takes place inside the body and zygote develops into larval stages.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

47. **Assertion (A):** Brittle stars have water vascular system which helps in many day to day activities.

Reason (R): Water vascular system is the distinctive feature of spiny bodied organisms.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

48. **Assertion (A):** In frog external fertilization takes place.

Reason (R): Frog is an aquatic amphibian

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

49. **Assertion (A):** Cyclostomes and cartilaginous fishes are similar in some characteristics.

REASON (R): Both are aquatic and possess cartilaginous cranium and vertebral column.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

50. **Assertion (A):** Syrnix is a characteristic feature of birds.

Reason (R): Syrnix reduces body weight & helps in flights.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

51. **Assertion (A):** Radial symmetry in animals is advantageous in detecting food and danger.

Reason (R): It allows the animal to be able to respond to stimulus from any direction.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3)(A) is true but (R) is false

(4) Both (A) and (R) are false

52. **Assertion (A):** Tapeworm, roundworm and pinworm are endoparasites of human intestine.

Reason (R): Improperly cooked food is one of the main causes of intestinal infections.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

53. **Assertion (A):** The digestive system in Platyhelminthes is called incomplete.

Reason (R): Platyhelminthes are mostly endoparasites found in animals including human beings.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

54. **Assertion (A):** Hemichordata was earlier considered as a sub-phylum under phylum Chordata but now it is placed as a separate phylum under non-chordata.

Reason (R): Stomochord of hemichordates and notochord of chordates are homologous structures.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

55. **Assertion (A):** Aschelminthes are called as round worms.

Reason (R): The body of the aschelminthes is circular in cross-section.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

56. **Assertion (A):** Hemichordates are non-chordata.

Reason (R): They do not have a notochord. In the light of the above statements choose the correct answer from the options given below:

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

57. **Assertion (A):** Frogs help maintain ecological balance.

Reason (R): Frogs serve as an important link in the food chain and food web in the ecosystem. In the light of the above statements choose the correct answer from the options given below:

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

58. **Assertion (A):** Frogs help maintain ecological balance.

Reason (R): Frogs serve as an important link in the food chain and food web in the ecosystem. In the light of the above statements choose the correct answer from the options given below:

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

59. **Assertion (A):** Frogs are at their most vulnerable to predators when they are undergoing metamorphosis.

Reason (R): At this time, the tail is being lost and locomotion by means of limbs is only just becoming established.

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

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

5. Morphology of Flowering Plants

1. **Assertion (A):** Fibrous root system of wheat is a kind of adventitious root system.

Reason (R): Fibrous root system arise from base of the stem.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

2. **Assertion (A):** Stems of maize and sugarcane have supporting roots.

Reason (R): Fibrous root system of maize and sugarcane cannot anchor their large sized stem.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

3. **Assertion (A):** Main function of stem is spreading out branches bearing leaves, flowers, and fruits.

Reason (R): Stem is differentiated into nodes and internodes.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

4. **Assertion (A):** In some plants of arid regions, stem becomes green, flat leaf like.

Reason (R): In arid areas rate of transpiration is high, so plants develop various adaptations to minimize transpiration.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

5. **Assertion (A):** Leaves show acropetal arrangement on plant.

Reason (R): Leaves arise from shoot apical meristem

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

6. **Assertion (A):** Leaf veins helps only in transport of water, minerals and food material.

Reason (R): Veins do not provide any kind of rigidity to the leaf blade.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

7. **Assertion (A):** In mustard leaves are compound.
Reason (R): In mustard leaf lamina shows incisions up to midrib.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

8. **Assertion (A):** In Calotropis and guava opposite phyllotaxy is found.
Reason (R): In Calotropis a pair of leaves arise on each node.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

9. **Assertion (A):** Flower is a modified shoot.
Reason (R): In flower vegetative shoot apical meristem changes to reproductive shoot apex floral meristem in which internodes do not elongate and the axis gets condensed.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10. **Assertion (A):** Flower is the reproductive unit in the angiosperms.
Reason (R): It carries sex organs of plant.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. **Assertion (A):** Canna flowers are asymmetric.
Reason (R): Canna flowers cannot cut into two equal halves by any vertical plane passing through centre.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. **Assertion (A):** In Lily flowers epiphyllous stamens are present.
Reason (R): In Lily flowers stamens are attached to petals.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

13. **Assertion (A):** Axile placentation is more advanced than parietal placentation.
Reason (R): Axile placentation arises from parietal placentation by inward enlargement of ovary wall, that's why ovary become multilocular.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

14. **Assertion (A):** In dry fruits pericarp is not differentiated into epicarp, mesocarp and endocarp.
Reason (R): In dry fruits pericarp is thin and not fleshy.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

15. **Assertion (A):** Floral formula does not present complete description of flowering plants or family.
Reason (R): In floral formula there is no description about aestivation of calyx and corolla.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

16. **Assertion (A):** Papilionoideae is sub family of Asteraceae.
Reason (R): Papilionoideae is also called as sunflower family.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

17. **Assertion (A):** Fruit is caryopsis in Poaceae.
Reason (R): Placentation is parietal in Poaceae.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

18. **Assertion (A):** Inflorescence in Compositae is capitulum.
Reason (R): Compositae is dicot family.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

19. **Assertion (A):** Five fused sepals are found in Papilionoideae.
Reason (R): Odd sepal is posterior in Papilionoideae.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

20. **Assertion (A):** In parallel multicostate, convergent venation network is not formed.
Reason (R): In parallel multicostate convergent venation, veinlets arise from midrib.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

21. **Assertion (A):** The compositae fruits may be of sorosis type as in pineapple or synconus type as in banayan.
Reason (R): The edible part of sorosis is fleshy thalamus.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

22. **Assertion (A):** In dicot families generally tetramerous condition is found.

Reason (R): In Cruciferae family pentamerous condition is found.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

23. **Assertion (A):** Cotton fibres are false fibres.

Reason (R): Cotton belongs to Malvaceae family.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

24. **Assertion (A):** The lateral roots are endogenous in origin.

Reason (R): The lateral roots originates from pericycle of root.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

25. **Assertion (A):** A flower with staminode is best suited for pollinating the pistil in artificial hybridisation experiments in angiosperms.

Reason (R): Flowers with staminodes are unisexual and produce a large number of pollens.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

26. **Assertion (A):** Parthenocarpy is undesirable in nut crops, such as pistachio.

Reason (R): The seed is the edible part in nut crops.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

27. **Assertion (A):** In cymose type of inflorescence, the growth of the main axis is limited.

Reason (R): In cymose type of inflorescence, the main axis terminates in a flower.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

6. Anatomy of Flowering Plants

1. **Assertion (A):** Within angiosperms, the monocots and dicots show difference in their internal structure.
Reason (R): Both monocots and dicots show diverse environmental adaptations.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

2. **Assertion (A):** Both apical and intercalary meristems are primary meristem.
Reason (R): They appear early in life of plant and contribute to the formation of primary plant body.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

3. **Assertion (A):** Simple permanent tissues are homogenous tissue.
Reason (R): Simple permanent tissue is made up of cells similar in structure and function.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

4. **Assertion (A):** Pits are present on cell wall of sclerenchyma.
Reason (R): Sclerenchymatous cells show deposition of lignin in discontinuous manner.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

5. **Assertion (A):** Xylem is conducting as well as mechanical tissue.
Reason (R): Xylem helps in transportation of water, minerals and show deposition of lignin on wall of their constitutents.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

6. **Assertion (A):** Both tracheids and vessels are devoid of protoplasm.
Reason (R): Both tracheids and vessels have to produce physical forces for ascent of sap so death of protoplasm is prerequisite.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

7. **Assertion (A):** Ontogenically tracheids are unicellular and vessels are multicellular.
Reason (R): Tracheids are made up of single cell while vessel is made up of several vessel elements.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

8. **Assertion (A):** companion cells are essential for functioning of sieve tubes.
Reason (R): The companion cells help in maintaining the pressure gradient in sieve tubes.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

9. **Assertion (A):** Epidermal stem hairs are of multicellular nature.
Reason (R): They are of absorptive nature.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10. **Assertion (A):** Ground tissue system is the fundamental tissue system of plant body.
Reason (R): Majority of the plant body is consisted of ground tissue system.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. **Assertion (A):** In roots vascular bundles show radial arrangement of xylem and phloem.
Reason (R): In roots arrangement of xylem and phloem on different radii facilitates absorption process.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. **Assertion (A):** The tangential as well as radial walls of the endodermal cells have a deposition of impermeable suberin.
Reason (R): Endodermis is the biological check point where entry and exit of useful substances is governed.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

13. **Assertion (A):** Stem branches are exogenous in origin.
Reason (R): Stem branches arise from pericycle.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

14. **Assertion (A):** Vascular cambium of dicot stem shows dual origin.
Reason (R): Partially it is made up of primary meristem and partially from secondary meristem.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

15. **Assertion (A):** Old woody plant parts are devoid of primary phloem.
Reason (R): Primary phloem get crushed due to continuous formation and accumulation of secondary xylem & secondary phloem.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

16. **Assertion (A):** In autumn wood xylary elements are more and having wider cavity.
Reason (R): In autumn wood there is less deposition of lignin on xylary elements.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

17. **Assertion (A):** Annual rings do not provide accurate estimation of age of plants.
Reason (R): Sometimes false annual rings can also arise due to mechanical pressure and jerks.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

18. **Assertion (A):** Number of sap wood cells remain constant, while of heart wood gradually increases.
Reason (R): Heart wood arises earlier than sap wood.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

19. **Assertion (A):** Cork is impervious to water.
Reason (R): It shows deposition of suberin on cell membrane.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

20. **Assertion (A):** Although lenticels are involved in gaseous exchange yet they do not found on leaves.
Reason (R): Lenticels are result of secondary growth while leaves do not show secondary growth.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

21. **Assertion (A):** Vascular cambium ring of roots is circular from beginning.
Reason (R): Cambium ring of roots arise from continuous pericycle ring from their same face.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

22. **Assertion (A):** Cotton fibres are not true fibres.
Reason (R): Cotton fibres are not lignified.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

23. **Assertion (A):** Most distinct annual rings are formed in tropical regions
Reason (R): Climatic variations are sharp in tropical regions
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

24. **Assertion (A):** In a hollow stem no vital function is affected.
Reason (R): In hollow stem heart wood is perish out and heart wood do not perform any vital function
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

25. **Assertion (A):** Mature sieve tube element is enucleated.
Reason (R): At maturity, nucleus is absent in sieve tube element.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

26. **Assertion (A):** Periderm includes cork, secondary cortex and cork cambium.
Reason (R): Periderm is formed due to activity of vascular cambium.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

27. **Assertion (A):** Commercial cork obtained from Quercus suber is a dead tissue with thickened walls by the deposition of suberin
Reason (R): Dendrochronology is the determination of age of a tree by counting the annual rings.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

28. **Assertion (A):** In dicot stem, endodermis is also referred to as the starch sheath.
Reason (R): The cells of endodermis are rich in starch grains.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

29. **Assertion (A):** In root primary xylem is of exarch nature.
Reason (R): In roots their main function is water absorption and due to their thin wall protoxylem is more efficient then metaxylem.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

30. **Assertion (A):** Guard cells of stomata are having thick and elastic cell wall.
Reason (R): Elastic wall is due to radial arrangement of cellulose microfibrils.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

31. **Assertion (A):** Suberization leads to death of cell.
Reason (R): Suberin is water resistant material.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

32. **Assertion (A):** Monocots do not form secondary tissues.
Reason (R): The vascular bundles have no cambium present in them.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

33. **Assertion (A):** Secondary growth takes place in dicot stems but not in monocot stems.
Reason (R): Hypodermis is collenchymatous in dicot stems while it is sclerenchymatous in monocot stems.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

34. **Assertion (A):** Many environmental scientists believe amphibians, including frogs, are good biological indicators of broader ecosystem health.
Reason (R): These organisms have intermediate positions in food chains, have permeable skins, and typically biphasic lives (aquatic larvae and terrestrial adults).
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

7. Structural Organization in Animals (Animal Tissue)

1. **Assertion (A):** Frogs undergo aestivation & hibernation

Reason (B): Frogs take shelter in deep burrows to protect themselves from extreme heat & cold.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

2. **Assertion (A):** The digits for forelimbs of frog possess a web.

Reason (R): The webs found in the digits of forelimbs help in swimming.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

3. **Assertion (A):** Frogs are considered important for mankind.

Reason (R): They eat insects and protect the crops.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

4. **Assertion (A):** The alimentary canal of a frog is short.

Reason (R): Frog is carnivorous.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

5. **Assertion (A):** Frogs have a short alimentary canal.

Reason (R): They are carnivores.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

6. **Assertion (A):** In frogs, external fertilization takes place.

Reason (R): Frog is an aquatic amphibian.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

7. **Assertion (A):** Frogs help maintain ecological balance.

Reason (R): The species which maintain ecological balance serve as an important link in the food chain and food web.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

8. **Assertion (A):** In frog, the alimentary canal is short, and length of intestine is reduced.

Reason (R): Frog is carnivorous in nature.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

9. **Assertion (A):** Frog shows phenomenon of hibernation

Reason (R): Frogs are poikilothermic animals

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

10. **Assertion (A):** Tendons and ligaments are dense regular connective tissue.

Reason (R): Dense regular connective tissue contains collagen fibres and fibroblast cells.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

11. **Assertion (A):** Development in cockroach is also termed as paurometabolous development.

Reason (R): In cockroach nymphal stage directly changes into adult without moulting.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

12. **Assertion (A):** Rana tigrina is cold-blooded or poikilotherm.

Reason (R): Its body temperature varies with the temperature of the environment. In the light of the above statements choose the correct answer from the options given below:

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

13. **Assertion (A):** Frogs help maintain ecological balance.

Reason (R): Frogs serve as an important link in the food chain and food web in the ecosystem. In the light of the above statements choose the correct answer from the options given below:

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

14. **Assertion (A):** The alimentary canal in frogs is short.

Reason (R): Frogs are carnivores.

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

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

15. **Assertion (A):** Frogs have the capability to change the colour and resemble their surroundings.

Reason (R): They are poikilothermous animals.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

16. **Assertion (A):** The skin of a frog is always kept moist and has a mucus

Reason (R): Frogs **respire** through the skin as well. In the light of the above statements choose the correct answer from the options given below:

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

8. Cell: The Unit of Life

1. **Assertion (A):** Cell theory was unable to explain about continuity of cells.
Reason (R): Initial cell theory did not explain as to how new cells were formed.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

2. **Assertion (A):** Rudolf Virchow was the pioneer scientist to modified Schleiden and Schwann's hypothesis.
Reason (R): Rudolf Virchow proposed about cell lineage.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

3. **Assertion (A):** Cytoplasm is the main arena of cellular activities in both plants and animals.
Reason (R): Various chemical reactions occur in it to keep the cell in the living state.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

4. **Assertion (A):** All the organelles of eukaryotic cells are surrounded by either single or double membrane.
Reason (R): In eukaryotic cell none of cell organelle can work and exist without membrane.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

5. **Assertion (A):** Fluid nature of the membrane is not useful from the point of view of functions like cell growth.
Reason (R): Cell growth like function are dependent on cell division ability which is not associated with cell enlargement.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

6. **Assertion (A):** Polar molecules can not pass through non polar lipid bilayer.
Reason (R): Polar molecules require a carrier protein of the membrane to facilitate their transport across the membrane.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

7. **Assertion (A):** Cell wall is not only a structural component but also show dynamic role for cell.
Reason (R): Cell wall helps in cell to cell interaction and provides barrier to undesirable macromolecules.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

8. **Assertion (A):** Endoplasmic reticulum, golgibody, lysosome and vacuoles are collectively considered as endomembrane system.
Reason (R): Because all of these arise from same source that is nuclear envelope.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

9. **Assertion (A):** Mitochondria, chloroplast and peroxisome are not involved in endomembrane system.
Reason (R): Their functions are not coordinated with constituents of endomembrane system.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10. **Assertion (A):** Smooth endoplasmic reticulum is frequently observed in protein secretory cells.
Reason (R): Lumen of smooth endoplasmic reticulum is the only storage site of secretory proteins.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. **Assertion (A):** Mitochondria are the site of aerobic respiration.
Reason (R): In Mitochondria, complete breakdown of respiratory substrate takes place in presence of oxygen.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. **Assertion (A):** Content of nucleolus is continuous with rest of the nucleoplasm.
Reason (R): Nucleolus is not covered with any kind of membrane.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

13. **Assertion (A):** Larger and more numerous nucleoli are present in cells actively carrying out protein synthesis.
Reason (R): Nucleolus is the site for active ribosomal RNA synthesis.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

14. **Assertion (A):** A single human cell has approximately two meter long thread of DNA distributed in each chromosome.
Reason (R): During different stages of cell division cells show organized nucleus in place of chromosome.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

15. **Assertion (A):** Every chromosome essentially has a primary constriction or the centromere.
Reason (R): On sides of centromere disc shaped structure called kinetochore are present.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

16. **Assertion (A):** Anton Von Leeuwenhoek first saw and described a live cell.
Reason (R): Robert Brown discovered nucleus.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

17. **Assertion (A):** Cell theory did not explain as to how new cells were formed.
Reason (R): Rudolf Virchow explained that new cells are formed from pre existing cells.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

18. **Assertion (A):** Cells vary greatly in their shape.
Reason (R): Shape may vary with the function the cell perform.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

19. **Assertion (A):** All eukaryotic cells are not identical.
Reason (R): Centrioles are found in animal cells, absent in almost all plant cell.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

20. **Assertion (A):** Primary wall is capable of growth.
Reason (R): It diminishes as cell matures.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

21. **Assertion (A):** The number of mitochondria per cell is variable.
Reason (R): It depends upon physiological activities of the cells.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

22. **Assertion (A):** Eukaryotic ribosome are 80s type.
Reason (R): 'S' indirectly measure of density and size.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

23. **Assertion (A):** The most extensive metabolic diversity is observed in organism having incipient nucleus.
Reason (R): Nucleus in multicellular organism inhibits some metabolic diversity.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

24. **Assertion (A):** Mitochondria, ER are largest organelle in an animal's cell.
Reason (R): Mitochondria, Chloroplast are semiautonomous cell organelles.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

25. **Assertion (A):** Cell is the fundamental structural and functional unit of all living organisms.
Reason (R): Anything less than a complete structure of a cell does not ensure independent living.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

26. **Assertion (A):** Like mitochondria, the chloroplasts are also double membrane bound. Of the two, the inner chloroplast membrane is relatively less permeable
Reason (R): Porins are present on inner membrane.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

27. **Assertion (A):** Cell is the fundamental structural and functional unit of all living organisms.
Reason (R): Because unicellular organisms can show independent existence and perform all metabolic activities.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

28. **Assertion (A):** True chromatin is absent in prokaryotes.
Reason (R): Mitosis does not occur in prokaryotes.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

29. **Assertion (A):** Ribosomes are known as RNP particles.
Reason (R): Ribosomes are made of rRNA and proteins.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

30. **Assertion (A):** Lysosomes are called 'Sicidal bags'.
Reason (R): A large number of hydrolytic enzymes are present in lysosomes.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

31. **Assertion (A):** Basal bodies are formed from centrioles.
Reason (R): Both basal bodies and centrioles have 9+2 structural organization.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

32. **Assertion (A):** Microtubules are present in eukaryotic cells.
Reason (R): Centrioles, basal bodies, flagella, cilia, spindle fibres are formed by microtubules.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

33. **Assertion (A):** Mitochondria is known as power house of cell.
Reason (R): ATP production takes place here.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

34. **Assertion (A):** The cells of testes and ovaries have abundance of Smooth Endoplasmic Reticulum.
Reason (R): The cells of testes and ovaries secrete steroid hormones.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

35. **Assertion (A):** The Golgi apparatus remains in close association with the endoplasmic reticulum.
Reason (R): The cis and the trans faces of the organelle are entirely different, but interconnected.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

36. **Assertion (A):** In eukaryotic cells, there is an extensive compartmentalisation of cytoplasm.
Reason (R): Eukaryotic cells are characterised by the presence of membrane bound organelles.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

9. Biomolecules

1. **Assertion (A):** We do not at the moment, understand the role or functions of all the secondary metabolite in host organisms.
Reason (R): Secondary metabolites arise from interaction of products of metabolic reactions.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

2. **Assertion (A):** Biomolecules which are found in the acid insoluble fraction are consider as macromolecules.
Reason (R): Biomolecules found in acid insoluble fraction have molecular weight more than 1000 Dalton.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

3. **Assertion (A):** Lipids whose molecular weight does not exceed 800 Dalton come under acid insoluble fraction.
Reason (R): Lipids are present not only as such but also arranged in structures like membranes during grinding these lipid form vesicle.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

4. **Assertion (A):** GLUT-4 is one of the essential protein for bioenergetics of the cell.
Reason (R): GLUT-4 enables glucose transport into cell.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

5. **Assertion (A):** Starch can be stained with iodine but cellulose can not be stained by iodine although both are homopolymer of glucose monomers.
Reason (R): Cellulose does not contain complex helices so can not hold iodine molecules.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

6. **Assertion (A):** Cellulose is a homopolymer, while chitin is a heteropolymer.
Reason (R): Cellulose is made up of identical monomers while chitin is made up of variable monomer units.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

7. **Assertion (A):** A nucleotide is an assemblage of three distinct components.
Reason (R): Nucleotide is made up of a heterocyclic compound, monosaccharide and nitrogenous base.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

8. **Assertion (A):** Adenine and Guanine are substituted purines.
Reason (R): In Adenine and Guanine purine heterocyclic ring has either amino or amino and oxy groups.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

9. **Assertion (A):** All living organisms from bacteria to human being show a dynamic state of body constituents.
Reason (R): Such dynamic state of body constituents keep maintain the level of energy and biochemicals required for livingness.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10. **Assertion (A):** Living state is a non equilibrium steady state to be able to perform work.
Reason (R): Any system of equilibrium can not work and living organisms work continuously so they can not afford to reach equilibrium.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. **Assertion (A):** In enzyme catalysed reaction there is obligatory formation of an E-S complex.
Reason (R): Such complex formation is a transient phenomenon which leads to creation of transition state structure in which bond making/breaking is completed.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. **Assertion (A):** The activity of an enzyme can be affected by change in the conditions which can alter the tertiary structure of the protein.
Reason (R): Tertiary structure of protein helps in determination of structural specificity of an enzyme.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

13. **Assertion (A):** When inhibitor closely resembles the substrate in its molecular structure and inhibit the activity of the enzyme then it is known as competitive inhibitor.
Reason (R): Due to close structural similarity with the substrate the inhibitor compete with the substrate for active sites of enzymes.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

14. **Assertion (A):** Metal ions are important for functioning of cells.
Reason (R): Metal ions may act as co-factor for several enzymes.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

15. **Assertion (A):** Codon for methionine & tryptophan said to be degenerate.
Reason (R): Methionine and tryptophan amino acids coded by more than one codons.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

16. **Assertion (A):** Glucose is commonest sugar which provides energy on hydrolysis.
Reason (R): Glucose is the precursor of all the types of carbohydrates.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

17. **Assertion (A):** All monosaccharides are reducing sugar.
Reason (R): Monosaccharides contain free aldehyde or free ketonic group.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

18. **Assertion (A):** Cholesterole is an important biochemical.
Reason (R): Cholesterole is parental steroid it plays important role in the synthesis of other biologically active steroid hormones.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

19. **Assertion (A):** Constant diameter of DNA double helix is 20 Å.
Reason (R): Purines always pair with pyrimidines and vice-versa
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

20. **Assertion (A):** Sucrose is known as invert sugar.
Reason (R): Sucrose is a disaccharide.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

21. **Assertion (A):** All monosaccharide give Benedict's test.
Reason (R): All monosaccharide contain free aldehyde or ketonic group.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

22. **Assertion (A):** Amino acids are interliked by hydrogen bonds to form secondary structure in a polypeptide chain.
Reason (R): Beta pleated sheet and alpha helices are secondary structures shown by polypeptide chain.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

23. **Assertion (A): Enzymes** have active sites and substrates has reactive sites, on their surfaces respectively.
Reason (R): Active and reactive sites push the enzyme and substrate molecules away from each other.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

24. **Assertion (A):** Enzymes are defined as biological proteins.
Reason (R): Chemically all enzymes are globular proteins (with few exceptions).
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

25. **Assertion (A):** Water accounts for about 80 to 90% of a plant cell's expansion.
Reason (R): Enzymes are active in hydrated medium only.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

26. **Assertion (A):** Deoxyribose, $C_5H_{10}O_4$ is not exactly hydrate of carbon.
REASON (R): Carbohydrates are hydrates of carbon so compounds which follow Cx (H_2O)Y formula are carbohydrates.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

27. **Assertion (A):** All the polysaccharides are homopolymers.
Reason (R): All the polysaccharides contain repeating units of glucose.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

28. **Assertion (A):** In solutions of different pH, the structure of amino acids changes.
Reason (R): A particular property of amino acids is the ionizable nature of $-NH_2$ and $-COOH$ groups.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

29. **Assertion (A):** Dietary proteins are the source of essential amino acids.
Reason (R): Amino acids are organic compounds containing an amino group and an acidic group as substituents on the same carbon.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

30. **Assertion (A):** Lipids separate in the macromolecular fraction of a cell.
Reason (R): Lipids are associated with membranes in a cell.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

31. **Assertion (A):** Enzyme catalysed reactions proceed at rates vastly higher than that of uncatalysed ones.
Reason (R): Enzymes require an optimum temperature and optimum pH to work efficiently.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

32. **Assertion (A):** The starch-I2 is blue in colour.
Reason (R): Starch forms helical secondary structures and can hold I2 molecules in the helical portion.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

33. **Assertion (A):** With the increase in substrate concentration, the velocity of the enzymatic reaction rises at first but ultimately reaches a maximum velocity which is not exceeded by any further rise in concentration of the substrate.
Reason (R): The enzyme molecules are fewer than the substrate molecules and after saturation of these molecules, there are no free enzyme molecules to bind with the additional substrate molecules.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

34. **Assertion (A):** Dietary proteins are the source of essential amino acids.
Reason (R): All essential amino acids are aromatic. In the light of the above statements choose the correct answer from the options given below:
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10. Cell Cycle & Cell Division

1. **Assertion (A):** Growth and reproduction are characteristics of cells, indeed of all living organism.
Reason (R): Cycle of growth and division allow a single cell to form a structure consisting of millions of cells.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

2. **Assertion (A):** Distribution of replicated chromosomes (DNA) to daughter nuclei by a complex series of events is almost accurate phenomenon.
Reason (R): Such distribution of replicated chromosomes to daughter nuclei by a complex series of events is under genetic control.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

3. **Assertion (A):** Cells in quiscent stage (G_0) are metabolically inactive, so don't show cell division.
Reason (R): Quiscent stage appears on exit of cell from G_2 phase of cell cycle.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

4. **Assertion (A):** In plant cells cell plate method is found for cytokinesis instead of cell furrow method.
Reason (R): Plant cell are enclosed by a relatively inextensible cell wall.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

5. **Assertion (A):** Meiosis involves two sequential cycles of nuclear and cell division called meiosis-I & meiosis-II, but only a single cycle of DNA replication.
Reason (R): Meiosis is aimed to produce reduced cells having half number of chromosome that mother cell.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

6. **Assertion (A):** Meiosis-I is most significant phenomenon from evolution point of view.
Reason (R): Meiosis-I leads to reduction in chromosome so that consistency of chromosome can be maintained.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

7. **Assertion (A):** Zygotene is characterized by formation of synaptonemal complex.
Reason (R): Synaptonemal complex helps in synapsis of non homologous chromosomes.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

8. **Assertion (A):** During pachytene crossing over takes place which is dependent on recombinase.
Reason (R): Recombinase is the group of enzymes involved in crossing over and crossing over in an enzyme dependent process.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

9. **Assertion (A):** Telophase-I leads to formation of diad of cells.
Reason (R): Telophase-I is marked by completion of karyokinesis and cytokinesis as well.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10. **Assertion (A):** During meiosis-I there is no division of chromosome.
Reason (R): During meiosis-I there is separation and movement of homologous, in order to reduce the number of chromosome half in daughter cells.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. **Assertion (A):** In meiosis, each bivalent is composed of four chromatids.
Reason (R): Pairing of homologous chromosomes take place in meiosis.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. **Assertion (A):** Replication of DNA not occurs during interkinesis.
Reason (R): Division of chromosomes takes place during meiosis-II.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

13. **Assertion (A):** Meiosis is also known as reduction division.
Reason (R): Meiosis reduces the number of chromosomes in daughter cells.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

14. **Assertion (A):** Meiosis is necessary for sexual reproduction.
Reason (R): Meiosis produces genetical identical cells.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

15. **Assertion (A):** Crossing over take place during pachytene stage.
Reason (R): It is a process of interchange of chromatid material between non sister chromatid of homologous chromosomes.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

16. **Assertion (A):** M-phase represents the phase when the actual cell division occurs.
Reason (R): Interphase represents the phase between two successive M-phase.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

17. **Assertion (A):** During S-phase, amount of DNA per cell doubles.
Reason (R): During S-phase, there is no increase in chromosome number.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

18. **Assertion (A):** G_0 (quiscent) stage is an inactive stage.
Reason (R): In G_0 stage, cells remain metabolically active.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

19. **Assertion (A):** M-phase is the most dramatic period of the cell cycle.
Reason (R): It involves a major reorganization of virtually all components of the cell.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

20. **Assertion (A):** Small cells are metabolically less active.
Reason (R): K.I. of small cells is less.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

21. **Assertion (A):** Crossing over is the only difference between mitosis & meiosis cell divisions.
Reason (R): Mitosis and Meiosis both are important to bring genetic variations.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

22. **Assertion (A):** Crossing over take place during pachytenesub stage.
Reason (R): It is a process of interchange of chromatid material between chromatid of nonhomologous chromosomes
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

23. **Assertion (A):** In meiosis II division is equational.
Reason (R): Homologous chromosomes are separated in anaphase II.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

24. **Assertion (A):** Cell division is a very important process in all living organisms.
Reason (R): During the division of a cell, DNA replication and cell growth also take place.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

25. **Assertion (A):** The interphase of the cell cycle is also called the resting phase.
Reason (R): No metabolic activity takes place inside the cell during the interphase.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

26. **Assertion (A):** Meiosis ensures the production of haploid phase in the life cycle of sexually reproducing organisms.
Reason (R): Syngamy restores the diploid condition in sexually reproducing organisms.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

27. **Assertion (A):** Metaphase is the stage at which morphology of chromosomes is most easily studied.
Reason (R): At this stage, metaphase chromosome is made up of two sister chromatids, which are held together by the centromere.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

28. **Assertion (A):** The cells that do not divide further exit G_1 phase to enter an inactive stage called quiescent stage (G_0) of the cell cycle.
Reason (R): Cells in G_0 stage no longer remain metabolically active and no longer proliferate unless called on to do so depending on the requirement of the organism.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

29. **Assertion (A):** Meiosis conserves specific chromosome number of each species across generations in sexually reproducing organisms.
Reason (R): Meiosis, per se, results in reduction of chromosome number by half. In the light of the above statements choose the correct answer from the options given below:
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. Photosynthesis in Higher Plants

1. **Assertion (A):** In photosynthesis there is synthesis of glucose but it is stored in form of starch.
Reason (R): Glucose is osmotically active while starch is osmotically inactive.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

2. **Assertion (A):** When *Cladophora* is placed on suspension of aerobic bacteria, bacteria accumulate in region of red and blue light of split spectrum.
Reason (R): In *Cladophora* there is maximum absorption of Blue and red light.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

3. **Assertion (A):** Biosynthetic phase of photosynthesis is known as dark reaction.
Reason (R): It takes place in absence of light.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

4. **Assertion (A):** Nomenclature of pigment systems as PS-I and PS-II is based on their functioning during light reaction.
Reason (R): During light reaction PS-II works first and PS-I works later.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

5. **Assertion (A):** The whole scheme of transfer of electrons starting from PS-II to $NADP^+$ is called z-scheme.
Reason (R): When all the carriers of this scheme are placed in sequence on a redox potential scale. They appear like Z.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

6. **Assertion (A):** Both PS-I and PS-II are located on same face of thylakoid membrane.
Reason (R): Photolysis of water and reduction of $NADP^+$ takes place in stroma site.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

7. **Assertion (A):** Like respiration in Photosynthesis too, ATP synthesis is linked to development of proton gradient across a membrane.
Reason (R): Proton gradient is the strongest source of potential energy which can be used in joining of ADP and P_i.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

8. **Assertion (A):** Biosynthetic phase of photosynthesis is also termed as dark reaction.
Reason (R): Biosynthetic phase is not directly dependent on light but it is supported by products of light reactions.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

9. **Assertion (A):** In all photosynthetic plants first fixation product during biosynthetic phase of photosynthesis is PGA.
Reason (R): PGA is the most stable product and is synthesized from both RuBP and PEP, whenever they act as first CO_2 accepting substance.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10. **Assertion (A):** To make one molecule of glucose 6 turns of Calvin cycle are required.
Reason (R): In each turn of Calvin cycle there is fixation of one CO_2 only while $6CO_2$ are required for each glucose.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. **Assertion (A):** C_4 plants can tolerate high temperature conditions.
Reason (R): Enzyme pepcase and PPDK work only on high temperature.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. **Assertion (A):** In C_4 plants there is no photorespiration.
Reason (R): In C_4 plants photolysis of H_2O and Rubisco activity show space differentiation..
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

13. **Assertion (A):** In mesophyll cells of C_4 plants there is no sugar formation after fixation of CO_2.
Reason (R): In mesophyll cells there is no Rubisco so C_3 cycle events can not operate.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

14. **Assertion (A):** The basic pathway that results in formation of sugars, the Calvin path way is common to the C_3 and C_4 plants.
Reason (R): C_3 path is the only biosynthetic path which yields sugar from CO_2.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

15. **Assertion (A):** Photorespiration is one of the wasteful processes.
Reason (R): In Photo respiration there is no synthesis of ATP and NADPH.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

16. **Assertion (A):** In C_4 plants Rubisco selectively shows carboxylase activity no oxygenase activity.
Reason (R): In C_4 bundle sheath cell malic acid is broken down to increase intracellular CO_2 concentration.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

17. **Assertion (A):** In Aquatic conditions usually CO_2 concentration regulates the rate of photosynthesis.
Reason (R): In Aquatic conditions generally CO_2 is available at suboptimal level.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

18. **Assertion (A):** In terrestrial conditions CO_2 usually acts as main determining factor of photosynthesis.
Reason (R): Usually CO_2 is available at sub optimal level in terrestrial conditions.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

19. **Assertion (A):** C_4 Plants were evolved to adapt for low atmospheric CO_2 concentration.
Reason (R): C_4 plants have minimum CO_2 compensation point.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

20. **Assertion (A):** C_3 plants donot show rise is photosynthesis at higher temperature.
Reason (R): Enzymes of C_3 plants are high temperature sensitive as compared to low temperature sensitive enzymes of C_4 plants.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

21. **Assertion (A):** Indirectly water stress leads to decrease in photosynthesis.
Reason (R): Water stress leads to wilt to leaves and minimize their surface area.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

22. **Assertion (A):** Photorespiration decreases the rate of photosynthesis.
Reason (R): RUBISCO can also behave as an oxygenase.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

23. **Assertion (A):** During photophosphorylation light energy is utilized to produce the proton gradient that is required for ATP synthesis
Reason (R): Oxidative phosphorylation results as the energy of oxidation-reduction is utilized for phosphorylation.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

24. **Assertion (A):** Chief photosynthetic pigment is chlorophyll a but plants evolved some other pigments also.
Reason (R): Photosynthetic efficiency is increased due to absorptions of variety of wavelengths.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

25. **Assertion (A):** Higher rate of photosynthesis is seen when plants are of wavelengths of visible light.
Reason (R): There is maximum absorption by chlorophyll a in the blue and the red regions of the visible light.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

26. **Assertion (A):** Cyclic photophos - phorylation results only in the synthesis of ATP, but not of . $NADPH^+ H^+$.
Reason (R): Cyclic photophos-phorylation occurs only when light of wavelengths beyond 680 nm are available for excitation.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

27. **Assertion (A):** The protons or hydrogen ions that are produced by the splitting of water accumulate within the lumen of the thylakoids.
Reason (R): 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.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

28. **Assertion (A):** The primary acceptor of carbon dioxide in C_3 plants is a 2-carbon compound.
Reason (R): The first product of carbon dioxide fixation in these plants is a C_3 acid.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

29. **Assertion (A):** The light-independent reactions do not require light, but they are most likely to occur day.
Reason (R): NADPH and ATP from the light-dependent reactions are used in the light-independent reactions.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

30. **Assertion (A):** Except for plants in shade or in dense forests, light is rarely a limiting factor for photosynthesis in nature.
Reason (R): Increase in incident light beyond a point causes the breakdown of chlorophyll and a decrease in photosynthesis.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

31. **Assertion (A):** Current availability of CO_2 levels is limiting to the C_3 plants.
Reason (R): Carbon dioxide is the major limiting factor for photosynthesis.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

32. **Assertion (A):** Plants that do not use PEP-carboxylase in carbon 3 plants.
Reason (R): The primary carboxylation reaction in C_3 plants, catalyzed by RuBisCO, produces the three carbon 3-phosphoglyceric acids directly in the Calvin Benson cycle.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

33. **Assertion (A):** ATP acts as the energy currency of the cell.
Reason (R): ATP is a ribonucleoside triphosphate.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

34. **Assertion (A):** It is possible to make calculations of the net gain of ATP for every glucose molecule oxidised; but in reality this can remain only a theoretical exercise.
Reason (R): These calculations can be made only on certain assumptions that are not really valid in a living system.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

35. **Assertion (A):** The alignment of the chloroplasts along the walls of the mesophyll cells vary depending on the amount of incident light.
Reason (R): The alignment of the chloroplasts along the walls of the mesophyll cells is such that they get the optimum quantity of the incident light.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

36. **Assertion (A):** Accessory photosynthetic pigments in higher plants enable a wider range of wavelength of incoming light to be utilised for photosynthesis.
Reason (R): Accessory pigments protect chlorophyll a from photo-oxidation.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

37. **Assertion (A):** The protons and O_2 formed by photolysis of water are released in the thylakoid lumen.
Reason (R): The water splitting complex is associated with the PS I, which itself is physically located on the outer side of the membrane of the thylakoid.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

38. **Assertion (A):** Electron transport via cytochrome b6f is responsible for creating the proton gradient that drives the synthesis of ATP in chloroplasts.
Reason (R): Cytochrome b6f complex functions to mediate the transfer of electrons and of energy between Photosystem II and Photosystem I, while transferring protons from the chloroplast stroma across the thylakoid membrane into the lumen.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

39. **Assertion (A):** Breakdown of proton gradient across the thylakoid membrane leads to the synthesis of ATP.
Reason (R): The gradient is broken down due to the movement of protons across the membrane to the stroma through the transmembrane channel of the CF0 of the ATP synthase.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

40. **Assertion (A):** Immediately after light becomes unavailable, the biosynthetic process continues for some time, and then stops.
Reason (R): The biosynthetic phase of photosynthesis depends on the products of the light reaction.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

41. **Assertion (A):** The enzyme that catalyses carboxylation of RuBP in Calvin cycle would be more correctly called RuBisCO rather than RuBP carboxylase.
Reason (R): This enzyme also has an oxygenation activity apart from a carboxylase activity.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. Respiration in Plants

1. **Assertion (A):** During oxidation of respiratory substrate energy does not release in a single step.
Reason (R): Breakdown of respiratory substrate in single step leads to unfavourable changes in cell temperature.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

2. **Assertion (A):** For plant respiration there is no need of specialized respiratory organs.
Reason (R): Plants donot show great demands for gaseous exchange.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

3. **Assertion (A):** Glycolysis is the oxidative process, while there is not utilization of O_2.
Reason (R): In glycolysis two redox equivalents are removed in form of two hydrogen atoms.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

4. **Assertion (A):** For complete breakdown of respiratory substrate Krebs cycle is essential.
Reason (R): Krebs cycle is associated with step wise removal of all the hydrogen and CO_2 molecules.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

5. **Assertion (A):** In Natural alcoholic drinks (beverages) alcohol level can never be exceed more than 13%.
Reason (R): Beyond 13% alcohol concentration yeast poison themselves to death.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

6. **Assertion (A):** Removal of all hydrogen atoms from pyruvic acid is the crucial event in aerobic respiration.
Reason (R): These removed hydrogens are actually the source of energy for ATP synthesis.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

7. **Assertion (A):** Ubiquinone is one of the important carrier of respiratory ETS.
Reason (R): Ubiquinone helps in oxidation of both $NADH_2$ and $FADH_2$.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

8. **Assertion (A):** Oxygen is vital for aerobic respiration.
Reason (R): Oxygen drives whole process by removing hydrogen from the system.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

9. **Assertion (A):** In ETS of respiration, oxidation of one carrier and reduction of another carrier is essential.
Reason (R): In respiratory ETS, energy of oxidation reduction utilized for production of proton gradient.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10. **Assertion (A):** The passage of protons through complex-V is coupled to production of ATP.
Reason (R): Passage of protons through complex-V is associated with breakdown of proton gradient which leads to release of energy for joining of ADP & Pi.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. **Assertion (A):** Calculation of the net gain of ATP for every glucose molecule oxidized is practically possible.
Reason (R): All the pathway work one after another and do not take place simultaneously.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. **Assertion (A):** During fermentation oxidation of NADH to NAD^+ is comparatively slow process than aerobic respiration.
Reason (R): NADH arise during fermentation do not enter in ETC, it is to reduce the pyruvate or aldehyde.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

13. **Assertion (A):** Respiratory path is an amphibolic pathway rather than as a catabolic one.
Reason (R): Respiratory pathway is involved in both anabolism and catabolism.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

14. **Assertion (A):** It is better to consider the respiratory pathway as an amphibolic pathway rather than only as a catabolic one.
Reason (R): Breaking down processes within the living organism is catabolism, and synthesis is anabolism.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

15. **Assertion (A):** When carbohydrates are used as respiratory substrate and are completely oxidised, the RQ will be 1.
Reason (R): Equal amounts of CO_2 and O2 are evolved and consumed, when carbohydrates are used as respiratory substrate and are completely oxidised.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

16. **Assertion (A):** During oxidation within a cell, all the energy contained in into the cell, in a single step.
Reason (R): The energy released by oxidation in respiration is not (or rather cannot be) used directly but is used to synthesise ATP.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

17. **Assertion (A):** When carbohydrates are used as substrate and are completely oxidised, the RQ will be 1.
Reason (R): The respiratory quotient depends upon the type of respiratory substrate used during respiration.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

18. **Assertion (A):** Water molecules appear on both sides of the equation of photosynthesis.
Reason (R): The molecules that enter the reaction are not the same molecules that emerge from the reaction.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

13. Plant Growth and Development

1. **Assertion (A):** Plants show open form of growth.
Reason (R): Plants retain their meristematic activity at certain locations, throughout their life.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

2. **Assertion (A):** Swelling of piece of wood when placed in water is not a growth.
Reason (R): Swelling of piece of wood when placed in water is an imbibition.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

3. **Assertion (A):** A sigmoid curve is characteristic of plants growing in natural environment.
Reason (R): In natural conditions generally food and space start to act as limiting factor.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

4. **Assertion (A):** Plant growth and development is intimately linked with the water status of plant cell.
Reason (R): Water provides the medium for enzymatic activities.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

5. **Assertion (A):** Environmental signals such as light and gravity also affect certain phases or stages of growth.
Reason (R): Gravity and light leads to differential auxin concentration which is responsible for differential growth.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

6. **Assertion (A):** The act leading to maturation is known as differentiation.
Reason (R): Differentiation leads to structural and functional maturation of cells from meristematio cells.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

7. **Assertion (A):** Secondary xylem and secondary phloem both are redifferentiated tissue.
Reason (R): Both of the tissue once again lose the capacity to divide, but mature to perform specific functions.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

8. **Assertion (A):** Callus arise from parenchymatous cells under controlled laboratory conditions, is dedifferentiated mas of cells.
Reason (R): In callus arise from parenchymatous cells, cells regain ability of further division and lost specific shape and functions.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

9. **Assertion (A):** Development is a broad and extensive aspect of the life of an organism.
Reason (R): Development includes all changes that an organism goes through during it's life cycle from birth of death.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10. **Assertion (A):** Growth regulators are intrinsic and intercellular factors which controls development of plant.
Reason (R): Growth regulators are produced by plant cell it self and work in cells other than those in which they synthesise.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. **Assertion (A):** Auxins are widely used for plant propagation.
Reason (R): Auxins inhibit preharvesting fruit drop.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. **Assertion (A):** By spray of gibberellin market period of fruits can be extended longer.
Reason (R): Somehow gibberellins delay senescence.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

13. **Assertion (A):** Gibberellin application increase sugarcane yield as much as 20 tonnes per acre.
Reason (R): Gibberellin leads bolting in sugarcane.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

14. **Assertion (A):** Kinetin is synthetic cytokinine.
Reason (R): Kinetin was obtained from herring sperm DNA.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

15. **Assertion (A):** Ethlene increases yield of deep water rice.
Reason (R): In deep water rice ethylene leads to elongation of either internode or petiole hence plant become able to overcome limiting effect of light.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

16. **Assertion (A):** Abscisic acid helps in making of seed as perennation structure.
Reason (R): Abscisic acid promotes dormancy so that seed can tolerate desiccation and other factors.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

17. **Assertion (A):** In day neutral plants there is no correlation between exposure to light duration and flowering response.
Reason (R): In Day neutral plant there is no specific requirement of light and dark hours.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

18. **Assertion (A):** Flowering in plants depends only on a combination of light and dark exposure.
Reason (R): Flowering is not dependent on relative duration of light and dark hours.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

19. **Assertion (A):** Vernalisation prevents precocious reproductive development till the plant matures.
Reason (R): Vernalisation leads to reduction in vegetative life of plant.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

20. **Assertion (A):** Winter varieties off wheat & rye are planted in autumn not in spring.
Reason (R): If winter varieties planted in spring normally they fail to flower or produce mature grain within a span of flowering season.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

21. **Assertion (A):** Growth, at cellular level, is measured by a variety of parameters some of which are: increase in fresh weight, dry weight, length, area, volume and cell number.
Reason (R): Growth, at a cellular level, is principally a consequence of increase in the amount of protoplasm and increase in protoplasm is difficult to measure directly.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

22. **Assertion (A):** A sigmoid curve is a characteristic of living organism growing in a natural environment.
Reason (R): It is typical for all cells, tissues and organs of a plant.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

23. **Assertion (A):** Plant growth is intimately linked to the water status of the plant while development is not.
Reason (R): The plant cells grow in size by cell enlargement which in turn requires water.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

24. **Assertion (A):** Apical dominance is most likely adaptive.
Reason (R): It is important for the plant to devote energy to growing upward so that it can get more light to undergo **photosynthesis**.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

25. **Assertion (A):** Gibberellins are used to increase the length of grape stalks.
Reason (R): Gibberellins help overcome apical dominance.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

26. **Assertion (A):** Spraying sugarcane crop with gibberellins increases the yield by as much as 20 tonnes per acre.
Reason (R): Spraying sugarcane crop with gibberellins increases the length of the stem.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

27. **Assertion (A):** The most widely used compound as source of ethylene is ethephon.
Reason (R): Ethephon in an aqueous solution is readily absorbed and transported within the plant and releases ethylene slowly.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

28. **Assertion (A):** Plants retain the capacity for unlimited growth throughout their life.
Reason (R): Meristems are present at certain locations in plant body.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

29. **Assertion (A):** 2, 4-D is used to prepare weed-free lawns by gardeners.
Reason (R): 2, 4-D, widely used to kill monocotyledonous weeds, does not affect mature dicotyledonous plants.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

30. **Assertion (A):** Spraying gibberellins on the tree can extend the market period for fruits.
Reason (R): Gibberellins delay senescence.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

31. **Assertion (A):** GA_3 is used in brewing industry.
Reason (R): GA_3 speeds up the malting process.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

32. **Assertion (A):** Spraying juvenile conifers with GAs delays seed production.
Reason (R): Spraying juvenile conifers with GAs delays the onset of maturity period.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

33. **Assertion (A):** ABA is also called the stress hormone.
Reason (R): ABA plays an important role in seed development, maturation and dormancy.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

14. Breathing and Exchange of Gases

1. **Assertion (A):** Larynx is a cartilaginous box which helps in sound production.
Reason (R): Epiglottis flap covers the glottis during swallowing and prevents the entry of food into the larynx.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

2. **Assertion (A):** The anatomical setup of lungs in thorax is such that any change in the volume of the thoracic cavity will be reflected in the lung cavity. (Pulmonary cavity)
Reason (R): Lungs have no muscles to directly alter the pulmonary volume.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

3. **Assertion (A):** Inspiration can occur if intra pulmonary pressure is less than the atmospheric pressure.
Reason (R): Inspiration is initiated by the relaxation of diaphragm and external intercostal muscle.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

4. **Assertion (A):** The volume of air a person can expire after normal inspiration is TV + ERV.
Reason (R): Volume of air that will remain in the lungs after a normal expiration is ERV + RV
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

5. **Assertion (A):** The amount of CO_2 that can diffuse through the diffusion membrane per unit difference in partial pressure in much higher compared to that of O_2.
Reason (R): The solubility of CO_2 is 20-25 times higher than that of O_2 solubility.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

6. **Assertion (A):** In the tissue high P_{O_2}, low P_{CO_2}, higher $H^{\oplus}$ concentration conditions are favourable for dissociation of oxygen from the oxyhaemoglobin.
Reason (R): Every 100ml of oxygenated blood can deliver around 5ml of O_2 to the tissues under normal physiological conditions.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

7. **Assertion (A):** A chemosensitive area is situated adjacent to the rhythm centre which is highly sensitive to CO_2 and hydrogen ions.
Reason (R): The role of oxygen in the regulation of respiratory rhythm is quiet insignificant.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

8. **Assertion (A):** Pneumotaxic centre can moderate the functions of the respiratory rhythm centre.
Reason (R): Neural signal from pneumotoxic centre can reduce the duration of inspiration and thereby the alter the respiratory rate.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

9. **Assertion (A):** Strong pneumotoxic signal results complete filling of lungs.
Reason (R): Strong pneumotaxic signal increases the duration of inspiration as well as expiration.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10. **Assertion (A):** Major part of CO_2 is transported in the form of sodium bicarbonate.
Reason (R): 7% of CO_2 is transported in dissolved state in plasma if blood in dissolved state in plasma of blood.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. **Assertion (A):** Emphysema is a chronic disorder in which alveolar walls are damaged due to which respiratory surface decreases.
Reason (R): One of the major cause of emphysema is inflammation of bronchi and bronchioles.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. **Assertion (A):** In the alveoli, dissociation of CO_2 from carbamino-haemoglobin takes place.
Reason (R): In the alveoli P_{CO_2} is low and P_{O_2} is high.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

13. **Assertion (A):** The blood transports carbondioxide comparatively easily.
Reason (R): During CO_2 transport chloride ions diffuse from plasma into the erythrocytes to maintain the ionic balance.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

14. **Assertion (A):** Low concentration of oxygen allow dissociation of oxyhaemoglobin.
Reason (R): CO has more affinity with Haemoglobin as compares to oxygen.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

15. **Assertion (A):** More carbonic acid is formed inside the RBC's than the plasma.
Reason (R): An enzyme carbonic anhydrase is present more inside the RBC's.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

16. **Assertion (A):** When body temperature rise oxyhaemoglobin dissociation curve will shift towards right.
Reason (R): In normal condition haemoglobin release 25% oxygen to tissues.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

17. **Assertion (A):** Rate of breathing is regulated by respiratory centres present in the medulla oblongata.
Reason (R): Changes in the CO_2 level of the arterial blood control the rate of breathing.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

18. **Assertion (A):** A bony flap epiglottis prevents the entry of food into the glottis.
Reason (R): The glottis is the common opening of food pipe & wind pipe.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

19. **Assertion (A):** Aerobic animals are not truely aerobic.
Reason (R): They produce lactic acid anaerobically.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

20. **Assertion (A):** During inspiration, pressure of air falls in the thorax.
Reason (R): There is a rise in volume of thorax during inspiration.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

21. **Assertion (A):** Symptoms of mountain sickness develops when a person living on plains ascends and stays on a mountain.
Reason (R): Air pressure and partial pressure of oxygen falls with the rise in altitude.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

22. **Assertion (A):** Ventilation process includes both active and passive mechanisms during inhalation.
Reason (R): Respiratory muscle contraction is ATP independent process, while gaseous exchange is a passive process
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

23. **Assertion (A):** The anatomical setup of lungs in thorax is such that any change in the volume of the thoracic cavity will be reflected in the lungs cavity.
Reason (R): The thoracic chamber is formed dorsally by the vertebral column, ventrally by sternum, laterally by the ribs and on the lower side by diaphragm.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

24. **Assertion (A):** It is essential for breathing that the anatomical setup of lungs in thorax is such that any change in the volume of the thoracic cavity will be reflected in the lung (pulmonary)
Reason (R): We cannot directly alter the pulmonary volume.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

25. **Assertion (A):** An increase in pulmonary volume will cause inspiration.
Reason (R): An increase in pulmonary volume increases the intra-pulmonary pressure to more than the atmospheric pressure.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

15. Body Fluids and Circulation

1. **Assertion (A):** If all external nerve supplies to a human heart are cut there will be no effect on the heart beat.
Reason (R): Human heart is a myogenic heart.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

2. **Assertion (A):** Lymph is the filtered blood from capillaries, which is rich in oxygen, but devoid of RBC.
Reason (R): RBC can filter out due to small diameters of fenestra of capillary, but O_2 can not do so.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

3. **Assertion (A):** In joint diastole, all the four chamber of heart are in relaxed state.
Reason (R): The tricuspid and bicuspid valves are open and the semilunar valves are closed at this stage.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

4. **Assertion (A):** The pause between the end of the second sound and the beginning of the first sound coincides with ventricular diastole.
Reason (R): The second sound (DUPP) is created by the closure of the semilunar valve.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

5. **Assertion (A):** Portal system consists of veins which start from capillaries and end into capillaries.
Reason (R): The hepatic portal vein carries deoxygenated blood from intestine to liver before it is delivered to the systemic circulation.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

6. **Assertion (A):** Atherosclerosis affects the vessels that supply blood to the heart muscle.
Reason (R): It is caused by deposits of calcium, fat, cholesterol and fibrous tissue which makes the lumen of arteries narrower.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

7. **Assertion (A):** In open circulatory system blood is pumped by heart passes through large vessels into open spaces or body cavities called sinuses.
Reason (R): This distribution of blood to different organs, is well regulated.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

8. **Assertion (A):** In fishes single circulation occur.
Reason (R): fishes have a 2-chambered heart with an atrium and a ventricle.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

9. **Assertion (A):** Myocardial infarction often results from a sudden decrease in coronary blood supply resulting in decreased oxygen supply.
Reason (R): The portion of myocardium without oxygen supply dies with in few minutes and then referred to as an infarct or myocardial infarction.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10 **Assertion (A):** The sino-atrial node (SAN) is called the pacemaker.
Reason (R): SAN is responsible for initiating and maintaining the rhythmic contractile activity of the heart.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. **Assertion (A):** The opening between the right atrium and the right ventricle is guarded by a bicuspid or mitral valve.
Reason (R): The valves in the heart allows the flow of blood only in one direction.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. **Assertion (A):** Neural signals through the sympathetic nerves can increase the rate of heart beat, the strength of ventricular contraction and thereby the cardiac output.
Reason (R): Adrenal medullary hormones can increase the cardiac output.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

13. **Assertion (A):** First heart sound (LUBB) is produced at the beginning of ventricular systole stage.
Reason (R): During ventricular systole semilunar valves are closed.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

14. **Assertion (A):** Open circulatory system is considered to be more advantageous than the closed circulatory system.
Reason (R): Open circulatory system is present in arthropods and molluscs, two of the most successful animal phyla.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

15. **Assertion (A):** The cardiac output of an athlete will be much higher than that of an ordinary man.

Reason (R): The body has the ability to alter the stroke volume as well as the heart rate and thereby the cardiac output.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

16. **Assertion (A):** Any deviation from the normal shape of ECG indicates a possible abnormality or disease.

Reason (R): The ECGs obtained from different individuals have roughly the same shape for a given lead configuration.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

17. **Assertion (A):** The human heart is called as myogenic.

Reason (R): The human heart is made up of cardiac muscles.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

18. **Assertion (A):** Heart failure is sometimes called congestive heart failure.

Reason (R): Heart failure means the state of heart when it is not pumping blood effectively enough to meet the needs of the body.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

16. Excretory Products and Their Elimination

1. **Assertion (A):** The wall of atria release ANF in response to high B.P. and blood volume.

Reason (R): ANF acts as vasodilator and inhibits the release of renin to lower the blood pressure.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

2. **Assertion (A):** Mostly aquatic animals are ammonotelic.

Reason (R): Ammonia is the most toxic form and requires large amount of water for its elimination.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

3. **Assertion (A):** Uricotelism is terrestrial adaptation.

Reason (R): Uric acid is least toxic and can be removed with a minimum loss of water.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

4. **Assertion (A):** In PCT all of the essential nutrient and 70-80 percent of electrolytes and water are reabsorbed.

Reason (R): PCT is lined by simple cuboidal brush border epithelium which increases the surface area for reabsorption.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

5. **Assertion (A):** When filtrate pass through descending limb of loop of Henle it becomes concentrate.

Reason (R): Descending limb allows transport of electrolytes actively or passively.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

6. **Assertion (A):** Mammals have the ability to produce a concentrated urine.

Reason (R): Counter current mechanism occurs in vasa recta and Henle's loop.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

7. **Assertion (A):** An increase in glomerular blood pressure can activate the JG cells of kidney to release renin.

Reason (R): Angiotensin I is a powerful vaso constrictor.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

8. **Assertion (A):** An increase in body fluid volume activate osmoreceptors, which stimulate the hypothalamus to release ADH.
Reason (R): ADH facilitates water reabsorption from later parts of the tubule.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

9. **Assertion (A):** Nearly 99 percent of the filtrate has to be reabsorbed by the renal tubules.
Reason (R): Glucose is reabsorbed by active mechanism in PCT.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10. **Assertion (A):** The primary function of sweat is to facilitate a cooling effect on the body surface.
Reason (R): Small amount of nitrogenous wastes could be eliminated through saliva.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. **Assertion (A):** The descending limb of loop of Henle is permeable to water but almost impermeable to electrolytes.
Reason (R): Henle's loop plays a significant role in the maintenance of high osmolarity of medullary interstitial fluid.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. **Assertion (A):** In cortical nephrons, the loop of Henle is too short and extends only very little into medulla.
Reason (R): Vasa recta is absent or highly reduced in cortical nephrons.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

13. **Assertion (A):** ADH prevents diuresis.
Reason (R): ADH also affect the kidney function by its constrictory effects on blood vessels.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

14. **Assertion (A):** The JGA plays a complex regulatory role.
Reason (R): An increase in glomerular blood flow/GFR can activate JG cells to release renin.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

15. **Assertion (A):** An increase in blood flow to the atria of heart can cause the release of ANF.
Reason (R): ANF can cause vasodilation and decrease the Blood pressure.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

16. **Assertion (A):** Haemodialysis method is used in case of kidney failure.
Reason (R): Malfunctioning of kidney leads to uremia.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

17. **Assertion (A):** Proximal convoluted tubule is lined by brush-bordered cuboidal epithelium.
Reason (R): PCT is main site of selective reabsorption of useful materials from nephric filtrate.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

18. **Assertion (A):** Diabetes insipidus is marked by excessive urination and too much thirst for water.
Reason (R): Anti-diuretic hormone is secreted by the posterior lobe of pituitary gland.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

19. **Assertion (A):** Antidiuretic hormone, increases the water permeability of distal convoluted tubule.
Reason (R): In the absence of ADH, water re-absorption is considerably increases.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

20. **Assertion (A):** Rate of glomerular filtration is directly proportional to secretion of renin from juxta-glomerular cells.
Reason (R): Renin converts angiotenin-I into angiotenisn II, which causes constriction of efferent arteriole.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

21. **Assertion (A):** Human heart is myogenic.
Reason (R): Right atrium of human heart has SA node.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

22. **Assertion (A):** Counter current mechanism operates in juxta-medullary nephrons.
Reason (R): In juxta-medullary nephrons loop of Henle is present only in cortex region and in close proximity with vasa recta
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

23. **Assertion (A):** Aldosterone is the main mineralocorticoid of the human body
Reason (R): Aldosterone is a type of corticoid which regulates the balance of water and electrolytes.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

24. **Assertion (A):** Diabetes insipidus is marked by excessive urination and too much thirst.
Reason (R): Anti-Diuretic hormone (ADH) is released from posterior lobe of pituitary gland
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

25. **Assertion (A):** In the descending limb of loop of Henle, the urine is hypertonic while in ascending limb of loop of Henle, the urine is hypotonic
Reason (R): Descending limb of loop of Henle is permeable to water, and ascending limb is impermeable to salts.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

26. **Assertion (A):** Atrial Natriuretic Factor is released by wall of atria.
Reason (R): It inhibits the release of renin from juxtaglomerular apparatus.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

27. **Assertion (A):** Glomerular filtration is considered as a process of ultra-filtration.
Reason (R): The glomerular capillary blood pressure causes filtration through three layers.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

28. **Assertion (A):** Tubular secretion helps in the maintenance of ionic and acid base balance of body fluids.
Reason (R): During urine formation, the tubular cells secrete substances like H^+, K^+ and ammonia into the filtrate.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

29. **Assertion (A):** Terrestrial adaptation in animals necessitated the production of lesser toxic nitrogenous metabolic wastes.
Reason (R): Terrestrial animals must conserve water.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

30. **Assertion (A):** ADH prevents diuresis.
Reason (R): ADH facilitates water reabsorption from the latter parts of the tubule.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

17. Locomotion And Movement

1. **Assertion (A):** Trachea is lined by ciliated epithelium.

Reason (R): The co-ordinated movements of cilia in the trachea help in removing dust particles and some of the foreign substances inhaled along with atmospheric air.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

2. **Assertion (A):** Skeletal muscles are closely associated with the skeletal components of the body.

Reason (R): Skeletal muscles are primarily involved in locomotory actions and changes of body postures.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

3. **Assertion (A):** Skeletal muscle fibre is syncitium as the sarcoplasm contains many nuclei.

Reason (R): The sarcoplasmic reticulum of the muscle fibre is the store house of calcium ions.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

4. **Assertion (A):** Contraction of a muscle fibre takes place by the sliding of the thin filaments over the thick filaments.

Reason (R): The central part of thick filament is not overlapped by thin filaments in a resting state.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

5. **Assertion (A):** During muscle contraction I-band and A-band get reduced.

Reason (R): During contraction thin filament slides over myosin filament.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

6. **Assertion (A):** Red muscles are also called aerobic muscles.

Reason (R): These muscles contain plenty of mitochondria which can utilize the large amount of oxygen stored in them for ATP production

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

7. **Assertion (A):** The skull region articulates with the superior region of the vertebral column with the help of two occipital condyles.
Reason (R): The number of cervical vertebrae are seven in almost all mammals including human beings.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

8. **Assertion (A):** The two halves of the pelvic girdle meet ventrally to form the pubic symphysis.
Reason (R): Pubic symphysis consist of immovable fibrous connective tissue.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

9. **Assertion (A):** Ca^{++} play an important role in the muscle contraction.
Reason (R): Calcium bind with a subunit of troponin on actin filaments and thereby remove the masking of active sites for myosin.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10. **Assertion (A):** First seven pairs of ribs are called true ribs.
Reason (R): They are attached to the thoracic vertebrae dorsally and ventrally connected to the sternum with the help of hyaline cartilage.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. **Assertion (A):** Progressive degeneration of skeletal muscle mostly due to genetic disorder, is muscular dystrophy.
Reason (R): Rapid spasms in muscle due to low Ca^{++} in body fluid, is tetany.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. **Assertion (A):** Muscle having special feature like excitability, conductivity & contractility.
Reason (R): Neuron having same type of character which equally found in muscle also.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

13. **Assertion (A):** In the contraction of muscle myosin slide on actin filament.
Reason (R): Actin become constant & myosin shows rotational movement proved by sliding filament theory.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

14. **Assertion (A):** Maximum degree of mobility can be seen with a ball & socket synovial joint.
Reason (R): A ball can rotate in a hollow spherical socket on infinite axises.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

15. **Assertion (A):** When the muscle fibre contracts, sarcomere length is reduced.
Reason (R): Sliding of myosin filament occurs due to rotational movement of myosin head.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

16. **Assertion (A):** Arthritis is the inflammation of synovial joints.
Reason (R): Synovial joints are mobile type of joints.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

17. **Assertion (A):** Axis vertebrae help in rotation of neck.
Reason (R): Centrum is absent in Atlas vertebrae.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

18. **Assertion (A):** Recurrent activation of the skeletal muscles results in fatigue.
Reason (R): Aerobic breakdown of glycogen in the muscles leads to the accumulation of lactic acid.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

18. Neural Control and Coordination

1. **Assertion (A):** Associative area are neither sensory nor motor.
Reason (R): Associative area is a type of memory bank where information's get stored.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

2. **Assertion (A):** Na^+–K^+ pump always remains open/active except depolarization.
Reason (R): Na^+–K^+ pump always try to maintain. Resting stage or undisturbed stage.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

3. **Assertion (A):** Human's brain having highly folded structure in gray matter as gyri & sulci.
Reason (R): Gyri & sulci are also present in cerebellum.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

4. **Assertion (A):** Chemical synapse always show unidirectional flow of nerve impulse act as one way valve.
Reason (R): Chemical energy in the form of neuro transmitter transmits from pre synaptic membrane to post synaptic membrane.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

5. **Assertion (A):** Medulla ablongata causes reflex actions like vomiting, Coughing and sneezing.
Reason (R): Medulla has many nerve cells which control autonomic reflexes.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

6. **Assertion (A):** Number of Neuron's always remains constant due to lack of centriole.
Reason (R): Neuron shows axoplasmic growth in which length of axon or neuron increases.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

7. **Assertion (A):** Schwann cells are present around myelinated & unmyelinated axon.
Reason (R): Schwann cell has functions of myelinogenes in PNS & function as packaging cell in autonomous neural system and somatic neural system.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

8. **Assertion (A):** Cerebellum is large, lobed and convoluted in active animals.
Reason (R): Cerebellum coordinates voluntary movements and helps in maintenance of posture and equilibrium.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

9. **Assertion (A):** Active transport results in solute movement against a concentration gradient.
Reason (R): Active transport of Na^+ and k^+ is energized by ATP.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10. **Assertion (A):** A neurotransmitter crosses the synapse and attaches to receptors on the post synaptic cell.
Reason (R): Depending on the neurotransmitter, it may excite or inhibit the post synaptic cell.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. **Assertion (A):** Transmission of a nerve impulse across a synapse is brought about by a neurotransmitter.
Reason (R): A neurotransmitter is necessary to transmit a nerve impulse across a synapse because there is a small gap, the synaptic cleft, between the two neurons at the synapse.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. **Assertion (A):** Stimulus is interpreted by the brain and not by sense organs.
Reason (R): Sense organs act as transducers, transforming the stimulus into impulse.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

13. **Assertion (A):** Tympanic membrane separates the external ear from the middle ear.
Reason (R): Tympanic membrane transmits vibrations (pressure waves in air) to the internal ear via ear ossicles of middle ear.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

14. **Assertion (A):** Cornea causes the maximum refraction of the light rays. This places the image approximately at the retina.
Reason (R): Cornea has a flat surface.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

15. **Assertion (A):** The receptor cells in the organ of Corti transmit impulses to the cerebral cortex to cause sensation of sound.
Reason (R): The organ of Corti is located in the utricle.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

16. **Assertion (A):** Medulla oblongata is very important for survival
Reason (R): Medulla oblongata regulates all involuntary activities.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

17. **Assertion (A):** Cerebral hemisphere is second most developed part of the brain.
Reason (R): Cerebrum is the largest part of the body.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

18. **Assertion (A):** All spinal nerves are mixed type.
Reason (R): Dorsal root is motor type while ventral root is sensory type.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

19. **Assertion (A):** In humans surface of cerebellum is more thick & folded.
Reason (R): This increases the surface the surface area for intelligency.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

20. **Assertion (A):** Impulse transmission across a chemical synaps is always faster than that across electrical synaps.
Reason (R): Electrical synapses are rare in our body.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

21. **Assertion (A):** Velocity of impulse in myelinated nerve fibre is more than non myelinated nerve fibre
Reason (R): Myelinated nerve fibre is having Schwann cells covering but non myelinated nerve fibre do not consist Schwann cells.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

22. **Assertion (A):** A cerebellum is related with skillful voluntary movement and involuntary activity like body balance, equilibrium etc.
Reason (R): It is part of hind brain and it is situated behind the pons.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

23. **Assertion (A):** Withdrawal reflex is controlled by spinal cord.
Reason (R): Initially cerebrum is involved and require alertness for perform this reflex.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

24. **Assertion (A):** In emergency condition. Catecholamines are secreted by adrenal medulla.
Reason (R): Sympathetic nervous system is stimulated & it directly effect the adrenal medulla & prepare the animal in emergency condition
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

25. **Assertion (A):** Amygdala body is a part of limbic system.
Reason (R): It controls the mood especially anger and rage.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

26. **Assertion (A):** Threshold stimulus is required for propagation of impulse
Reason (R): Threshold stimulus produce action potential therefore conduction of impulse occur.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

27. **Assertion (A):** Speed of nerve impulse is faster on medullated nerve fibres, than nonmedullated nerve fibres.
Reason (R): In medullated nerve fibres nerve impulses are conducted in a saltatory manner.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

28. **Assertion (A):** Neuron is the longest cell of human body.
Reason (R): It contain dendrites and axon.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

29. **Assertion (A):** Nerve impulse conduction is one way conduction.
Reason (R): Neurotransmitters are only present at axon terminals.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

30. **Assertion (A):** In a myelinated nerve fibre the impulse jumps from one node of Ranvier to the other.
Reason (R): Exchange of ions takes place only at node of Ranvier.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

31. **Assertion (A):** Minimum stimulus required to open Na^+ VGC as the result of which depolarization occurs, is called action potential.
Reason (R): Average value of RMP is +70 mV.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

32. **Assertion (A):** The imbalance in concentration of Fe^{+2} Ca^{+2}, Mg^{+2}, Na^+, K^+ and proteins generate action potential.
Reason (R): To maintain the unequal distribution of Na^+ and K^+ the neurons use electrical energy.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

33. **Assertion (A):** A real and inverted image is obtained on the retina.
Reason (R): Maximum refraction of light is caused by aqueous humor and lens.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

34. **Assertion (A):** Blind spot of the retina of the eye is devoid of the ability of vision.
Reason (R): The photoreceptor rods & cone cells are absent in the blind spot.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

35. **Assertion (A):** Accommodation power is present in human eye.
Reason (R): It depends on the sliding of lens forward and backward.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

36. **Assertion (A):** Tympanic membrane separates the external ear from the middle ear.
Reason (R): Tympanic membrane transmits vibrations to the internal ear via ear ossicles of middle ear.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

37. **Assertion (A):** Vitamin-A deficiency produces night blindness
Reason (R): Photosensitive pigment rhodopsin is synthesised from vitamin A.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

38. **Assertion (A):** The auditory ossicles help in hearing.
Reason (R): Auditory ossicles maintain the balance of air pressure between two sides of the ear drum.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

39. **Assertion (A):** The cristae and maculae are the specific receptors of the vestibular apparatus.
Reason (R): Cristae and maculae maintain balance and body posture.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

40. **ASSERTION (A):** The axonal membrane of the neuron during resting stage is more permeable to sodium ions (Na^+) and nearly impermeable to potassium ions (K^+)
REASON (R): In resting state neurons does not conduct any impulse, so these don't require ATP to remain in a resting state.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

41. **Assertion (A):** When light strikes the retina, potential differences are generated in photoreceptors
Reason (R): Light induces dissociation of the retinal from opsin resulting in changes in the structure of the opsin which in turn causes membrane permeability changes.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

19. Chemical Coordination and Integration

1. **Assertion (A):** Posterior lobe of pituitary gland secretes ADH and oxytocin.
Reason (R): ADH and oxytocin are formed in hypothalamus also called neurohormones.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

2. **Assertion (A):** Parathormone & thyrocalcitonin are antagonist to each other.
Reason (R): Parathormone maintains Ca^{+2} concentration in blood and it's receptors are present in osteoclast cells.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

3. **Assertion (A):** Thymus gland has important role in both CMI & AMI (Immunity).
Reason (R): Thymus gland maintains BMR & growth of body.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

4. **Assertion (A):** MSH & Melatonin are antagonistic hormones.
Reason (R): MSH help in the wide distribution of melanin in melanocytes while melatonin collects the melanin at one place in melanocyte.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

5. **Assertion (A):** Adrenal gland have dual origin.
Reason (R): The adrenal cortex develop from endoderm while adrenal medulla develop from mesoderm.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

6. **Assertion (A):** Pineal gland is found on the epithalamus of Diencephalon.
Reason (R): It is a type of exocrine gland which is active in later age of life.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

7. **Assertion (A):** Pancreas is a heterocrine gland.
Reason (R): Pancreas secretes both protein & steroid hormones.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

8. **Assertion (A):** Two pituitary hormones of the mother take part in feeding the infant on milk
Reason (R): Prolactin from anterior pituitary stimulates mammary glands for the formation of milk, and oxytocin from the posterior pituitary cause the release of milk when the infant sucks breast.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

9. **Assertion (A):** Vasopressin is also called as antidiuretic hormone
Reason (R): Vasopressin reduces the loss of water in the urine by increasing water reabsorption in the nephrons.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10. **Assertion (A):** Cortisol therapy is useful in organ transplantation
Reason (R): Cortisol act as immunosuppressant
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. **Assertion (A):** Catecholamines (adrenaline) are emergency hormones.
Reason (R): Catecholamines are released from adrenal cortex
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. **Assertion (A):** Thyrocalcitonin & Parathormone have antagonistic effect on blood calcium level.
Reason (R): Thyrocalcitonin lower the blood calcium level and parathormone raises the blood calcium level by removal of calcium from bone and reabsorption of calcium from nephrons.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

13. **Assertion (A):** Adrenal cortex can be removed without causing death.
Reason (R): Adrenal cortex is not vital for survival.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

14. **Assertion (A):** ADH is secreted by hypothalamus.
Reason (R): Changes in osmotic pressure are noted by osmoreceptors present in the hypothalamus.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

15. **Assertion (A):** FSH is also known as interstitial cell stimulating hormone.
Reason (R): It is because of the fact that FSH stimulates the interstitial cells of testis.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

16. **Assertion (A):** Thymus undergoes no change even in old age.
Reason (R): Thymus being a part of body's immune system, tends to persist throughout life
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

17. **Assertion (A):** Aldosterone is a steroid hormone and is important in the control of sodium and potassium ion concentration in mammals.
Reason (R): Aldosterone upgrades sodium ion concentration in the ECF by promoting reabsorption of sodium ions from renal tubules and excretion of potassium ions in urine.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

18. **Assertion (A):** PTH is a hypercalcemic hormone which increases blood Ca^{++} levels.
Reason (R): PTH acts on bones and stimulates reabsorption of bone demineralisation. PTH also stimulate reabsorption of Ca^{++} by renal tubules.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

20. Reproduction in Organism and Sexual Reproducing in Flowering Plants

1. **Assertion (A):** In western countries a large number of pollen products in form of tablets and syrups are available.
Reason (R): Pollen grains are rich in nutrients and used as food supplement.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

2. **Assertion (A):** During embryo sac formation megaspore divides by incomplete mitotic division.
Reason (R): In these mitotic divisions karyokinesis is not immediately followed by cytokinesis.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

3. **Assertion (A):** Geitonogamy is functionally cross pollination and genetically self pollination.
Reason (R): It involves pollinating agent but pollen grains come from same plant.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

4. **Assertion (A):** All aquatic plants use water for pollination.
Reason (R): In aquatic habitat, water is the only medium for transfer of gametes.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

5. **Assertion (A):** Self incompatibility is one of the device to prevent inbreeding.
Reason (R): This is physiological process which prevents cross pollination.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

6. **Assertion (A):** Dynamic process pollen pistil interaction can help to overcome incompatibility barriers.
Reason (R): Knowledge gained in this area would help the plant breeders in manipulating pollen-pistil interaction.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

7. **Assertion (A):** Most zygotes divide only after certain amount of endosperm is formed.
Reason (R): This is an adaptation to provide assured nutrition to the developing embryo.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

8. **Assertion (A):** Strawberry and cashew are false fruits.
Reason (R): They arise before fertilization.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

9. **Assertion (A):** Seed is the basis of agriculture.
Reason (R): Due to dehydration and dormancy mature seed can be stored for next season.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10. **Assertion (A):** Active research is going on in many laboratories around the world to understand the genetics of apomixis.
Reason (R): If hybrids are made into apomictics, there is no segregation of characters.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. **Assertion (A):** Clone is formed by amphimixis.
Reason (R): In amphimixis, new plants are formed without fertilization and meiosis.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. **Assertion (A):** Pollen tube shows apical growth.
Reason (R): Growth of pollen tube is controlled by generative nucleus.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

13. **Assertion (A):** In Angiosperms, sexual reproduction take place through the flower.
Reason (R): All the parts of the flower are modification of stem.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

14. **Assertion (A):** With increase in population size, environmental resistance tends to increase.
Reason (R): This is a **nature's** way to check the expression of biotic potential.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

15. **Assertion (A):** Nucellus plays important role for developing embryo sac.
Reason (R): Nucellus is nutritive tissue have abundant reserve food material.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

16. **Assertion (A):** Pollen pistil interaction is a safety measure to ensure that illegitimate crossing do not occur.
Reason (R): Compatibility and incompatibility of pollen pistil is determined by special proteins.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

21. Human Reproduction & Reproductive Health

1. **Assertion (A):** Placenta is combined structure of foetal tissue & maternal tissue

Reason (R): Placenta formation is completed before 6 weeks of pregnancy

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

2. **Assertion (A):** Seminal vesicle is called as accessory sex organ of male.

Reason (R): Seminal vesicle help in union of gametes.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

3. **Assertion (A):** Testes are retroperitoneal organ in man.

Reason (R): Peritoneal layer covers the testes on dorsal side.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

4. **Assertion (A):** The oviducts (fallopian tubes), uterus and vagina constitute the female accessory ducts.

Reason (R): The edges of the infundibulum possess finger-like projections called fimbriae, which help in collection of the ovum after ovulation.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

5. **Assertion (A):** In ovarian cycle corpus luteum is an exocrine gland.

Reason (R): It secretes the pheromones.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

6. **Assertion (A):** Failure of testes to descend into the scrotum causes sterility in man

Reason (R): Higher temperature of the abdomen than in the scrotum is suitable for sperm development.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

7. **Assertion (A):** The menstrual flow results due to breakdown of endometrial lining of the uterus and its blood vessels.

Reason (R): Rapid fall in the level of progesterone takes place due to degeneration of corpus luteum.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

8. **Assertion (A):** Corpus albicans is an inactive structure which is found in the ovary.

Reason (R): Corpus albicans secretes the progesterone hormone after ovulation.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

9. **Assertion (A):** Menarche starts around the age of puberty.
Reason (R): After birth oocyte is matured and developed to form Graafian follicle.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10. **Assertion (A):** Corpus luteum is present in proliferative phase of menstrual cycle.
Reason (R): High concentration of progesterone is present in proliferative phase.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. **Assertion (A):** Testes are situated in the extra abdominal cavity.
Reason (R): Spermatogenesis process requires less temperature as compared to body temperature.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. **Assertion (A):** During embryonic stage testes descend down and at the time of birth, It comes into scrotum.
Reason (R): Spermatogeneis process requires less than body temperature.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

13. **Assertion (A):** After ovulation ruptured graafian follicle transforms into corpus luteum.
Reason (R): Corpus luteum act as endocrine gland and it is stable through out life.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

14. **Assertion (A):** After fertilization corpus luteum is stable till parturition.
Reason (R): After 3 months of intrauterine life, it dominantly secretes progesterone.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

15. **Assertion (A):** Ovulation occurs on the 14^{th} day of menstrual cycle in a human female.
Reason (R): The high level of estrogen is controlled 2 or 3 days before this event due to negative feed back.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

16. **Assertion (A):** Sperm formation continues even in old men but formation of ovum ceases in women around the age of fifty years.
Reason (R): Human male having the longer life span than the female.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

17. **Assertion (A):** In barrier methods ovum and sperms are prevented form physically meeting with the help of barriers.
Assertion (A): Diaphragms, cervical caps an and vaults are barrier made of rubber that are inserted into the female reproductive tract.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

18. **Assertion (A):** Formation of sperm takes place in seminiferous tubules of testes.
Reason (R): Seminiferous tubules lined with male germ cells and sertoli cells.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

19. **Assertion (A):** Periodic abstinence is a natural method, where couples abstain from coitus.
Reason (R): Coitus from day 5-10 of the menstrual cycle should be avoided, because this is the time of ovulation.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

20. **Assertion (A):** The menstrual flow results due to breakdown of endometrial lining of the uterus and its blood vessels.
Reason (R): Rapid fall in the level of progesterone takes place due to degeneration of corpus luteum.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

21. **Assertion (A):** During follicular phase, the primary follicles in the ovary grow to become a fully mature Graafian follicle.
Reason (R): Endometrium of uterus regenerates during follicular phase due to increasing level of progesterone.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

22. **Assertion (A):** The changes in the ovarian cycle as well as uterine cycle are induced by changes in the level of pituitary and ovrian hormones.
Reason (R): The secretion of LH & FSH increases gradually during the follicular phase and estrogen also secreted by developing follicle.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

23. **Assertion (A):** The menstrual cycle not occurs in the female aged more than around 50 years of age.
Reason (R): Endometrium disintegrates in their uterus completely.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

24. **Assertion (A):** Regular cyclic menstruation is an indicator of normal reproductive phase.
Reason (R): It occurs throughout the reproductive phase of normal female.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

25. **Assertion (A):** All copulations not lead to fertilization and pregnancy.

Reason (R): Fertilization can only occur if the ovum and sperms are transported simultaneously to the ampullary region.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

26. **Assertion (A):** The acrosomal secretions of sperm; help it in entering in the cytoplasm of the ovum.

Reason (R): It contains sperm lysin.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

27. **Assertion (A):** The nucleus of sperm fuses with the nucleus of ovum, before the formation of ootid.

Reason (R): Diploid nuclear status of organism is essential for its development.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

28. **Assertion (A):** Females not participate in the determination of the sex of baby.

Reason (R): Human male is heterogametic.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

29. **Assertion (A):** hCG, hPL and relaxin are produced in women only during pregnancy.

Reason (R): These hormones are produced by placenta.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

30. **Assertion (A):** The levels of hormone like estrogens, progestogens, cortisol, Prolactin, thyroxin etc. are increased several folds in the maternal blood during pregnancy.

Reason (R): Increased level of these hormones is essential for supporting the foetal growth and maintenance of pregnancy.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

31. **Assertion (A):** Foetal ejection reflex triggers release of oxytocin from the maternal pituitary.

Reason (R): Signals for parturition originate from fully developed foetus alone.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

32. **Assertion (A):** Breast-feeding during the initial period of infant growth is recommended by doctors.

Reason (R): The milk produced during initial few days contains several antibodies.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

33. **Assertion (A):** Primary spermatocytes of testes are haploid.

Reason (R): Primary spermatocytes are formed by meiosis I in the spermatogonia.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

34. **Assertion (A):** Spermiation is the transformation of spermatid into sperm.

Reason (R): During spermiation, sperms get nutrition from Sertoli cells.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

35. **Assertion (A):** Contraceptive pills inhibit ovulation and implantation as well as alter the quality of cervical mucus to prevent or retard the entry of sperms.

Reason (R): 'Saheli' a new oral contraceptive for females is once a week pill with very few side effects and contains a non steroidal preparation.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

36. **Assertion (A):** Surgical method blocks gamete transport and thereby prevent conception.

Reason (R): Surgical method are highly effective but their reversibility is very poor.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

37. **Assertion (A):** During oogenesis polar bodies are formed.

Reason (R): Primary function of formation of polarbodies is to bring haploidy of ovum.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

38. **Assertion (A):** When sperm enters in egg, one polar body is released in human.

Reason (R): At the time of ovulation eggs found in secondary Oocyte phase.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

39. **Assertion (A):** Cleavage in human zygote is holoblastic.

Reason (R): Its egg contain enormous quantity of yolk.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

40. **Assertion (A):** All eutherian are placental mammals.

Reason (R): All placental mammals have menstrual cycle.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

41. **Assertion (A):** Some athletes take "steroids" in an attempt to enhance their physical performance but not advisable.
Reason (R): This can lead to decreased sperm production and even sterility.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

42. **Assertion (A):** Viruses are an exception to cell theory.
Reason (R): Viruses are noncellular in nature.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

43. **Assertion (A):** In five kingdom system, Whittaker emphasized on reproductive characters of living beings.
Reason (R): Reproductive characters show less variations.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

44. **Assertion (A):** Archaebacteria are most resistant to adverse environmental conditions.
Reason (R): In archaebacteria, cell wall is highly resistant and complex.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

45. **Assertion (A):** Spermiation takes place in epididymis.
Reason (R): Sertoli cells remain attached to spermatozoa in epididymis.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

46. **Assertion (A):** Parturition is induced by a complex neuroendocrine mechanism.
Reason (R): The signals for parturition originate from fully developed fetus and placenta.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

47. **Assertion (A):** Placenta act as endocrine gland
Reason (R): It secretes steroidal hormones to maintain structure of corpus luteum.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

48. **Assertion (A):** Ovulation occurs due to LH surge.
Reason (R): LH surge induces completion of meiosis I in primary oocyte.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

49. **Assertion (A):** Seminal plasma lacks spermatozoa.

Reason (R): Seminal plasma contains secretions of seminal vesicles only.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

50. **Assertion (A):** Saheli 'once a week' pill has very few side effects and high contraceptive value.

Reason (R): Saheli contains a non-steroidal preparation.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

51. **Assertion (A):** In the absence of fertilization corpus luteum degenerates in 7 to 10 days

Reason (R): Degeneration of corpus luteum is due to non availability of FSH from anterior pituitary.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

22. Principles of Inheritance and Variation

1. **Assertion (A):** Inheritance is the basis of heredity.
Reason (R): Inheritance is the process by which characters are passed on from parent to progeny.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

2. **Assertion (A):** During Mandel's investigation into inheritance patterns, it was for the first time that statistical analysis & mathematical logics were applied to the problems in biology.
Reason (R): Mendel conducted hybridization experiments on garden pea for seven years & proposed laws of inheritance.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

3. **Assertion (A):** Mendel conducted artificial pollination experiments using several true-breeding pea lines.
Reason (R): Mendel selected 14 true-breeding pea plant varieties.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

4. **Assertion (A):** Mendel never supported blending inheritance.
Reason (R): He found that the F_1 always resembled either one of the parents.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

5. **Assertion (A):** Genes are the units of inheritance.
Reason (R): They contain the information that is required to express a particular trait in an organism.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

6. **Assertion (A):** Punnett square is a graphical representation to calculate the probability of all possible genotypes of offsprings in a genetic cross.
Reason (R): It was developed by a British geneticist, Reginald C. Punnett.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

7. **Assertion (A):** Incomplete dominance made it possible to distinguish heterogyzous from homozygous.
Reason (R): In incomplete dominance F_1 had a phenotype that did not resemble either of the two parents and was in between the two.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

8. **Assertion (A):** There are six different combinations or genotypes of the human ABO blood types.
Reason (R): The gene (I) has three alleles I^A, I^B and I^O.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

9. **Assertion (A):** In co-dominance and incomplete dominance, the genotypic & phenotypic ratios are same.
Reason (R): In case of co-dominance the F_1 generation resembles both parents.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10. **Assertion (A):** Multiple alleles can be found only when population studies are made.
Reason (R): Occasionally, a single gene product may produce more than one effect.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. **Assertion (A):** According to Mendel, a dihybrid cross is the multiple of two monohybrid crosses.
Reason (R): When two pairs of traits are combined in a hybrid, segregation of one pair of characters is independent of the other pair of characters.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. **Assertion (A):** In ♂ grasshopper, some of the sperms bear X-chromosome whereas some do not.
Reason (R): Grasshopper is an example of XX-XY type of sex determination.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

13. **Assertion (A):** In birds, the females have one Z and one W chromosome, whereas male have a pair of Z-chromosomes besides autosomes.
Reason (R): In birds, sex of the offsprings in decided by the temperature of surroundings when they are released.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

14. **Assertion (A):** Mutation results in changes in the genotype and the phenotype of an organism.
Reason (R): Mutation is a phenomenon, which results in alternation of DNA sequences.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

15. **Assertion (A):** In human genetics, pedigree study provides a strong tool, which is utilized to trace the inheritance of a specific trait, abnormality or disease.
Reason (R): The controlled crosses that can be performed in pea plant or some other organisms, are not possible in case of human beings.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

16. **Assertion (A):**  symbol represents normal parents with affected male child.
Reason (R): It is a autosomal dominant disorder.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

17. **Assertion (A):** An X-linked recessive trait shows transmission from carrier male to female progeny.
Reason (R): X-linked recessive trait shows non-crisscross inheritance.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

18. **Assertion (A):** In sickle cell anaemia, the shape of RBC becomes elongated sickle like from biconcave disc.
Reason (R): The mutant haemoglobin molecule undergoes polymerization under low oxygen tension causing the change in shape.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

19. **Assertion (A):** Gynacomastia is observed in Turner's syndrome.
Reason (R): Such a disorder is caused due to the presence of extra copy of X-chromosome.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

20. **Assertion (A):** Trisomy or monosomy situation leads to a very serious consequences in the individual.
Reason (R): Down's syndrome is the trisomy of chromosome-21.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

21. **Assertion (A):** In a person with AB-blood group, the erythrocytes carry both A and B antigen on their surface.
Reason (R): The alleles I^A and I^B that produce AB blood group are codominant and both are expressed.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

22. **Assertion (A):** Male and female ratio is almost equal in this world.
Reason (R): Male and female genotype is XX and XY respectively.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

23. **Assertion (A):** Recessive characters are always pure.
Reason (R): Recessive genes always express itself in homozygous condition.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

24. **Assertion (A):** For recessive autosomal disease both parents are normal and their first son is diseased.

Reason (R): Both the parents are heterozygous

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

25. **Assertion (A):** Mendel gave postulates like "principles of segregation and principles of independent assortment" after studying seven pairs of contrasting traits in garden pea.

Reason (R): He was lucky in selecting seven characters in pea that were located on seven different chromosomes.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

23. Molecular Basis of Inheritance

1. **Assertion (A):** Antiparallel polarity helps in stability of DNA.
Reason (R): It allows complementary pairing between base pairs.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

2. **Assertion (A):** Positively charged histone proteins are essential for packaging negatively charged DNA.
Reason (R): Without histone protein DNA can not fold due to negative charge.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

3. **Assertion (A):** Unequivocal proof that DNA is the genetic material came from Griffith's transformation experiment.
Reason (R): The biochemical nature of genetic material was defined from transformation experiment.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

4. **Assertion (A):** RNA is not a predominant genetic material.
Reason (R): RNA being unstable, mutate at faster rate.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

5. **Assertion (A):** In the same generation for transmission of genetic information's RNA is better than DNA.
Reason (R): The protein synthesizing machinery has evolved around RNA.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

6. **Assertion (A):** Essential life processes evolved around RNA.
Reason (R): Beside genetic material RNA also act as catalyst.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

7. **Assertion (A):** DNA replication is energetically a very expensive process.
Reason (R): Unwinding of DNA strands is an active process, while pairing of bases is a passive process.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

8. **Assertion (A):** On template 5'$\rightarrow$3' DNA replicate in discontinouous manner.
Reason (R): DNA polymerase catalyse polymerization only in one direction that is 5' $\rightarrow$ 3'
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

9. **Assertion (A):** The replication of DNA and cell division cycle should be highly coordinated.
Reason (R): A failure in cell division after DNA replication results into chromosomal anomaly.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10. **Assertion (A):** The presence of introns is reminiscent of antiquity & the process of splicing represents the dominance of RNA world.
Reason (R): The split gene arrangement represents an advanced feature of the genome.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. **Assertion (A):** Genetic codes are unambiguous & specific.
Reason (R): Some amino acids are coded by more than one codon.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. **Assertion (A):** An mRNA also have some additional sequences that are not translated & are referred as UTR.
Reason (R): The UTRs are present at both 5' end & at 3' end and they have no specific function.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

13. **Assertion (A):** It is the metabolic, physiological or environmental conditions that regulate the expression of genes.
Reason (R): The genes in a cell are expressed to perform a particular function or a set of functions.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

14. **Assertion (A):** Lac operator is present only in lac operon & it interact specifically with lac repressor only.
Reason (R): Each operon has its specific operator & specific repressor.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

15. **Assertion (A):** Gene regulation in prokaryotes is comparatively simple than eukaryotes.
Reason (R): In most of prokaryotic operons the genes present int the operon are needed together to function in the same or related metabolic pathway.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

16. **Assertion (A):** In lac operon, a polycistronic structural gene is regulated by a common promoter & regulatory genes.
Reason (R): Such arrangement is very common in bacteria & is referred as operon.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

17. **Assertion (A):** The gene I codes for the repressor of the lac operon.
Reason (R): The y-gene codes for permease, which increases permeability of the cell to β-galactosidase.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

18. **Assertion (A):** Lactose is the substrate for the enzyme β-galactosidase & it regulates switching on & off the operon.
Reason (R): A very low level of expression of lac operon is always present in cell the time.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

19. **Assertion (A):** HGP was closely associated with the rapid development of a new area in biology called as Bioinformatics.
Reason (R): The enormons amount of data generated in HGP necessitated the use of high speed computational devices for data storage & analysis.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

20. **Assertion (A):** Many non-human model organisms have also been sequenced
Reason (R): Their sequences can be applied towards solving challenges in health care, agriculture, energy production etc.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

21. **Assertion (A):** BAC & YAC are the common vectors used in HGP.
Reason (R): IN HGP, sequencing was done by automated DNA sequencers that worked on methods of F. Sanger.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

22. **Assertion (A):** The sequencing of chromosome-1 was completed at last in May-2006.
Reason (R): Chromosome-1 in the longest chromosome with maximum number of genes.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

23. **Assertion (A):** DNA fingerprinting involves identifying differences in some specific regions in DNA called as repetitive DNA sequences.
Reason (R): These sequences show high degree of polymorphism & form the basis of DNA fingerprinting.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

24. **Assertion (A):** DNA polymorphism arises due to mutations.
Reason (R): An inheritable mutation which is observed in a population at high frequency, is referred to as DNA polymorphism.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

25. **Assertion (A):** The VNTR belongs to a class of satellite DNA referred to as mini-satellite.
Reason (R): The mini-satellite numbers remains same from chromosome to chromosome in an individual.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

26. **Assertion (A):** In DNA fingerprinting, after hybridization with VNTR probe, the autoradiogram gives many bands of different sizes.
Reason (R): It differs from individual to individual in a population except fraternal twins.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

27. **Assertion (A):** The sensitivity of fingerprinting technique has been increased by the use of PCR.
Reason (R): DNA from a single cell is not enough to perform DNA finger printing analysis.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

28. **Assertion (A):** Operon concept is applicable only in prokaryotes.
Reason (R): Gene expression in prokaryotes is influenced by environmental conditions.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

29. **Assertion (A):** DNA serves as hereditary material.
Reason (R): DNA functions as blue-print for building and running cellular machinery.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

30. **Assertion (A):** DNA is chemically less reactive as compare to RNA.
Reason (R): Few RNA have the ability of catalysis.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

31. **Assertion (A):** Enzyme helicase acts over the ori site and unwinds the two strands of DNA with the help of topoisomerase.
Reason (R): Unwinding creates tension in the uncoiled part by forming more super coils so tension is released by enzyme topoisomerase.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

32. **Assertion (A):** DNA polymerase II fills the gap that is left after the removal of RNA primers during DNA replication.
Reason (R): In eukaryotes RNA polymerase I transcribes rRNA, hnRNA and t-RNA.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

33. **Assertion (A):** Both the strands of DNA are not copied during transcription.
Reason (R): The two RNA molecules if produced simultaneously would be complementary to each other, hence would form a double stranded RNA which would prevent RNA from being translated into protein.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

34. **Assertion (A):** The split gene arrangement represents probably the ancient feature of genome.
Reason (R): The process of splicing represents the dominance of RNA world.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

35. **Assertion (A):** Among the two nucleic acid, DNA is a better genetic material.
Reason (R): DNA chemically in less reactive and structurally more stable when compared to RNA.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

36. **Assertion (A):** The split gene arrangement represents probably the ancient feature of genome.
Reason (R): The process of splicing represents the dominance of RNA world.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

37. **Assertion (A):** Among the two nucleic acid, DNA is a better genetic material.
Reason (R): DNA chemically in less reactive and structurally more stable when compared to RNA.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

24. Evolution

1. **Assertion (A):** There has been gradual evolution of life forms at earth.
Reason (R): The new forms of life arose at different periods of history of earth.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

2. **Assertion (A):** Any population has built in variation in characteristics.
Reason (R): Variations are stable and inheritable.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

3. **Assertion (A):** Those who are better reproductively fit in an environment, leave more progeny than others.
Reason (R): These will survive more and hence are selected by nature.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

4. **Assertion (A):** Charles Darwin concludes that reproductively fit population produces more progenies and there are much more chances of their survival. They will get selected by nature.
Reason (R): He called natural selection as a mechanism of evolution.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

5. **Assertion (A):** Alfred Russel Wallace, a naturalist worked in Malay Archepelago that is Modern Indonesia.
Reason (R): He divided earth in seven geographical realms based on the distribution of invertebrates.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

6. **Assertion (A):** The ancestors of present life forms were present at different periods in the history of earth.
Reason (R): The geological history of earth closely correlates with the biological history of earth.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

7. **Assertion (A):** Different-aged rock sediments contain fossils of different life forms.
Reason (R): The different organisms buried during the formation of the particular sediment.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

8. **Assertion (A):** In England, before industrialization, it was observed that there were more white-winged moths on trees than dark-winged or melanized moths.
Reason (R): White winged moths can survive only in non industrialized area.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

9. **Assertion (A):** Lichens can be used as industrial pollution indicator.
Reason (R): Lichens forces the moth to change as dark-winged or white winged in industrial area.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10. **Assertion (A):** Selection of resistant varieties in a much lesser time scale is now possible.
Reason (R): Origin of virus like organism is an example of progressive evolution.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. **Assertion (A):** Australian marsupials can be taken as an example of adaptive radiation.
Reason (R): A number of marsupials, evolved from an ancestral stock, but all within the Australian island continent.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. **Assertion (A):** Tasmanian wolf and Placental wolf are the good example of convergent evolution.
Reason (R): More than one adaptive radiation appeared to have occurred in an isolated geographical area, (representing different habitats) one can call this convergent evolution.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

13. **Assertion (A):** The rate of appearance of new forms is linked to the life cycle or the life span of organisms.
Reason (R): The organism with short life span have ability to produce more progenies in shorter time and that have chance to more exposure with nature.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

14. **Assertion (A):** Fitness is the end result of the ability to adapt and get selected by nature.
Reason (R): Some organisms are better adapted to survive in an otherwise hostile environment.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

15. **Assertion (A):** According to Hugo de Vries; it is mutation which causes speciation and hence called it saltation.
Reason (R): Mutations are random and directional.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

16. **Assertion (A):** Due to continental drift pouched mammals of Australia survived.
Reason (R): There is lack of competition from any other mammal.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

17. **Assertion (A):** Some mammals like whales, dolphins seals and sea cows etc. live wholly in water.
Reason (R): They evolve from aquatic reptilian ancestors.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

18. **Assertion (A):** *Homo sapiens* arose in Africa and moved across continents and developed into distinct races.
Reason (R): After development of agriculture human settlements started.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

19. **Assertion (A):** *Dryopithecus* and *Ramapithecus* were hairy and walked like gorillas and chimpanzees.
Reason (R): *Australopithecus* probably lived in East African grasslands.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

20. **Assertion (A):** Branching descent and Natural selection are the two key concepts of Darwinian theory of evolution.
Reason (R): Darwinism is able to explain the presence of vestigial organ.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

21. **Assertion (A):** *Homo erectus* had a large brain that is around 900C.C.
Reason (R): *Homo erectus* probably ate meat.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

22. **Assertion (A):** Analogous structures are a result of convergent evolution.
Reason (R): Different structures evolving for the same function and hence having similarity.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

23. **Assertion (A):** The original drifted population in a new habitat becomes founders and the effect is called founder effect.
Reason (R): Darwin finches of Galapagos island shows adaptive radiation.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

24. **Assertion (A):** Hardy Weinberg principle says that allele frequencies in a population are stable and is constant from generation to generation.
Reason (R): Genetic drift operates in small population.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

25. **Assertion (A):** Homologous organs suggest same origin.

Reason (R): Organs which are similar in function and dissimilar in internal morphology called as Homologous organs.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

26. **Assertion (A):** Miller used four gases- methane, oxygen, hydrogen and water vapour for formation of simple organic compounds.

Reason (R): He prepared some proteins in his apparatus.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

27. **Assertion (A):** Evolution of man is the example of progressive evolution.

Reason (R): Tapworm is development due to retrogressive evolution.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

25. Human Health and Disease

1. **Assertion (A):** Tobacco contain nicotine type of alkaloids.
Reason (R): Nicotine can be used as a raw material for preparation of nicotinic acid.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

2. **Assertion (A):** Opium is derived from latex of unripe fruits of *Papaver somniferum*.
Reason (R): Opium addict loses weight, fertility and interest in work.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

3. **Assertion (A):** HIV virus is retrovirus.
Reason (R): It can form viral DNA by reverse transcription.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

4. **Assertion (A):** Asthma often occurs in allergic person on exposure to allergen.
Reason (R): Administration of antihistamine drugs to a person before exposure will prevent spasm.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

5. **Assertion (A):** Cocaine has a potent stimulating action on central nervous system.
Reason (R): Excessive dosage of cocaine causes hallucinations.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

6. **Assertion (A):** All the infectious diseases are fetal like AIDs, common cold etc.
Reason (R): Infectious diseases are not common.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

7. **Assertion (A):** Cancer causes major causality among the non-infectious disease.
Reason (R): Now a days cancer is established along with infectious disease.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

8. **Assertion (A):** A wide range of bacteria, viruses, fungi, protozoans, helminthes etc. could causes diseases in man. Such disease-causing organisms are called pathogens.
Reason (R): Pathogens have to adapt to life within the environment of the host.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

9. **Assertion (A):** Sustained high fever (30° to 40°C), weakness, stomach pain, constipation, headache and loss of appetite are some of the common symptoms of typhoid fever.
Reason (R): Typhoid is caused by gram positive bacteria *Clostridium typhi*.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10. **Assertion (A):** Mary Mallon nicknamed Typhoid Mary.
Reason (R): She was a typhoid carrier.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. **Assertion (A):** In severe causes of Pneumonia; the lips and finger nails may turn gray to bluish in colour.
Reason (R): In Pneumonia the alveoli get filled with fluid leading to severe problems in respiration.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. **Assertion (A):** *Haemophilus influenzae* causes pneumonia in human.
Reason (R): It's infection is more common in children.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

13. **Assertion (A):** Nasal congestion and discharge, sore throat, hoarseness, cough, headache, tiredness etc. are the usual symptoms of common cold.
Reason (R): Rhino virus infect the nose, and respiratory passage but not the lungs.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

14. **Assertion (A):** In common cold diseases, the droplets resulting from cough or sneezes of an infected person are either inhaled directly or transmitted through contaminated objects and cause infection in healthy person.
Reason (R): The disease is caused by Rhino viruses and the infections lasts for 48 hours.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

15. **Assertion (A):** In amoebic dysentery house flies act as mechanical carries and serve to transmit the parasite from faces of infected person to food and food products, there by contaminating them.
Reason (R): *Entamoeba histolytica* completes its life cycle in human and house flies.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

16. **Assertion (A):** Internal bleeding, muscular pain, fever, anaemia and blockage of the intestinal passage are the common symptoms of ascariasis.
Reason (R): The eggs of *Ascaris* are excreted along with the faces of infected persons which contaminate soil, water plants etc and these are the source of infection of a healthy person.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

17. **Assertion (A):** *Microsporum, Trichophyton* and *Epidermophyton* are generally acquired from soil or by using towels, clothes or even the comb of infected individuals.
Reason (R): These fungi causes dry, scaly lesions on various parts of the body called ringworms.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

18. **Assertion (A):** In biopsy test for cancer, piece of the suspected tissue cut into thin sections is stained and examined under X-ray by a pathologist.
Reason (R): Use of X-ray is able to generate a 3-D image of the section of affected tissue.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

19. **Assertion (A):** Barbiturates, amphetamines etc. are normally used as medicines to help patients cope with mental illnesses.
Reason (R): Amphetamines are used as antisleep pills.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

20. **Assertion (A):** Balanced diet, personal hygine and regular exercise are very important to maintain good health.
Reason (R): Yoga has been practiced to achieve physical & mental health.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

21. **Assertion (A):** Malignant malaria is caused by *Plasmodium vivax*.
Reason (R): Haemozoin is only produced in malaria caused by *P. vivax*.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

22. **Assertion (A):** A larger number of infectious diseases like polio, diphtheria, Pneumonia, and tetanus have been controlled to a large extent by the use of vaccines.
Reason (R): Vaccination helps in developing passive immunity from the disease.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

23. **Assertion (A):** The T-lymphocytes produce an army of proteins in response of pathogens our blood to fight with them.
Reason (R): The B-Lymphocyte help the T-lymphocyte to produce antibody.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

24. **Assertion (A):** A HIV/AIDs is not spread by mere touch or physical contact.
Reason (R): Skin surface having acidic medium.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

25. **Assertion (A):** Several genes called cellular oncogenes (C-onc) or protooncogene have been identified in normal cells which when activated under certain conditions, could lead to oncogenic transformation of the cells.
Reason (R): Ionising radiations like X-rays and gamma rays, non-ionizing radiations like UV cause DNA damage leading to oncogenic transformation of the cells.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

26. **Assertion (A):** Radiography, computed tomography and MRI are very useful to detect cancers of the internal organs.
Reason (R): X-ray is used in radiography & CT-scan while strong magnetic fields and non-ionizing radiation is used in MRI-technique.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

27. **Assertion (A):** α-interferon is given to cancer patient which helps in destroying the tumour.
Reason (R): α-interferon is biological response modifiers, which activates the immune system and helps in destroying tumour.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

28. **Assertion (A):** Drugs like barbiturates, amphetamines, benzodiazepine are normally used as medicines to help patients cope with mental illnesses like depression and insomnia.
Reason (R): These chemicals impairs their physical, physiological or Psychological functions.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

29. **Assertion (A):** 'Good humor' hypothesis of health was disproved by William Harvey.
Reason (R): He demonstrated normal body temperature in blackbile persons.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

30. **Assertion (A):** HIV/AIDS is not spread by mere touch or physical contact.
Reason (R): It spreads only through body fluids.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

31. **Assertion (A):** AIDS is not a congenital disease.
Reason (R): During lifetime, individual acquires deficiency of immune system.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

32. **Assertion (A):** It is imperative for physical and psychological well being, HIV/AIDS infected persons are not isolated from family and society.
Reason (R): AIDS spreads only through body fluids.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

33. **Assertion (A):** "Don't die of ignorance" slogan has been rightly said for AIDS.
Reason (R): It spreads due to conscious behavior pattern and is not something that happen inadvertently.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

34. **Assertion (A):** In MRI, strong magnetic field is used, so very useful to detect cancer.
Reason (R): CT scan uses X-rays to generate a 3D-image.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

35. **Assertion (A):** C-onc are proto oncogenes.
Reason (R): These found in normal cells.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

36. **Assertion (A):** Cancer cells show a property of contact inhibitions.
Reason (R): When these curve in contact with other cells, inhibits their uncontrolled growth.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

37. **Assertion (A):** Principle of vaccination is based on the property of 'memory' of the immune system.
Reason (R): In vaccination, a preparation of antigenic protein of pathogens or inactivated/weakened pathogen are introduced into the body.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

38. **Assertion (A):** Active immunity is slow.
Reason (R): It takes time to develop memory and its full effective response.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

39. **Assertion (A):** Mother's milk is considered very essential for new born infants.
Reason (R): Colostrum has I_gA antibodies and nutrients.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

40. **Assertion (A):** The exaggerated response of the immune system to certain antigens present in the environment is called allergy.
Reason (R): Allergy is due to release of chemicals like histamine and serotonin from the mast cells.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

41. **Assertion (A):** Spleen, lymph nodes, tonsils payer's patched of small intestine and appendix are secondary lymphoid organs (S.L.O.)
Reason (R): SLO provided the sites for storing and interaction of lymphocytes with antigens.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

42. **Assertion (A):** MALT contributes about 50% of the lymphoid tissue in human body.
Reason (R): MALT is located within the lining of the major tracts like respiratory, digestive and urogenital.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

43. **Assertion (A):** Bone marrow is primary lymphoid organs.
Reason (R): All blood cells including lymphocytes are produce in bone marrow.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

44. **Assertion (A):** Curiosity, need for adventure and excitement, and experimentation constitute common caused, which motivates youngsters towards drug and alcohol use.
Reason (R): A child's natural curiosity motivates him/her to experiment.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

45. **Assertion (A):** Of late, stress from pressures to excel in academics or examination, has played a significant role in persuading the youngsters to try alcohol and drugs.
Reason (R): First use of drugs or alcohol may be out of curiosity or experimentation, but later the child starts using these to escape facing problems.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

46. **Assertion (A):** Tobacco contains nicotine alkaloid, which stimulates adrenal gland.
Reason (R): Adrenaline and nor-adrenaline both raise blood pressure and increase heart rate.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

47. **Assertion (A):** Smoking increases CO content in blood.
Reason (R): Smoking reduces concentration of heambound oxygen.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

48. **Assertion (A):** Cocaine or coca alkaloid interferes the transport of dopamine.
Reason (R): Coca plant *Erythroxylum coca* is native to south America.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

49. **Assertion (A):** Morphine is useful in patients who have undergone surgery.
Reason (R): It is very effective sedative and painkiller.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

50. **Assertion (A):** Personal hygiene includes keeping the body clean.
Reason (R): Public hygiene includes proper disposal of waste and excreta.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

51. **Assertion (A):** Cell mediated immunity induces humoral immunity
Reason (R): T cells themselves do not secrete antibodies but help B cells to produce them
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

52. **Assertion (A):** Cocaine produces a sense of euphoria.
Reason (R): It interferes with the transport of the neurotransmitter dopamine
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

53. **Assertion (A):** Bone marrow and thymus gland are primary lymphoid organs
Reason (R): Bone marrow and thymus provide the sites for interaction of lymphocytes with the antigen, which proliferate to become effector cells.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

54. **Assertion (A):** AIDS patients suffer from infections due to Mycobacterium, viruses, fungi and even parasites like Toxoplasma.
Reason (R): AIDS causes progressive decrease in the number of helper T-lymphocytes.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

55. **Assertion (A):** IgA provides immunity against inhaled and ingested pathogens
Reason (R): IgA is secretory antibody and it is present in the lining of respiratory and intestinal tract.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

26. Biotechnology : Principles and Processes & Biotechnology and its Applications

1. **Assertion (A):** Green revolution succeeded in tripling the food supply.
Reason (R): It is mainly due to the use of better management practices and use of agrochemicals.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

2. **Assertion (A):** GM technique has been used to creat tailor made plants to supply alternative resources to industries.
Reason (R): Plants, bacteria, fungi & animals whose genes have been altered by manipulation are called GMO.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

3. **Assertion (A):** *Bacillus thuringiensis* produces protein that kills lepidopteran insect only.
Reason (R): It forms active protein crystals during a particular phase of their growth.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

4. **Assertion (A):** Crystal protein does not kill the Bacillus & kill only insect.
Reason (R): In Bacillus it exist as inactive proteins but in insect it is converted into an active form due to acidic pH of the gut.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

5. **Assertion (A):** The activated toxin binds to the surface of midgut epithelial cells & create pores that cause cell swelling & lysis & finally death of insect.
Reason (R): Most of Bt toxins are insect group specific.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

6. **Assertion (A):** The choice of cry-gene depends upon the crop & the targeted pest.
Reason (R): Gene cry IAc & cry II Ab control the cotton bollworms while cry IAb controls corn borer.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

7. **Assertion (A):** RNAi involves silencing of a specific mRNA due to complementary RNA that binds to & prevents translation of the mRNA.
Reason (R): RNAi takes place in all prokaryotic organisms as a method of cellular defense.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

8. **Assertion (A):** The nematode parasite could not survive in a transgenic plant expressing specific interfering RNA.
Reason (R): The sense & anti-sense RNA in host are complementary & forms a dsRNA, thus silenced the specific m RNA of nematod.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

9. **Assertion (A):** The recombinant therapeutics do not induce unwanted immunological response.
Reason (R): About 30 recombinant therapeutics have been approved for human use world-wide.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10. **Assertion (A):** The proinsulin contains an extra stretch called as C-peptide.
Reason (R): Insulin consists of two short polypeptide chans A & B that are linked together by disulphide bridges.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. **Assertion (A):** The main challenge for production of insulin using r-DNA technique was getting insulin assembled into a mature form.
Reason (R): The C-peptide is not present in mature insulin & is removed during maturation process.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. **Assertion (A):** Eli Lilly prepared two DNA sequences of A & B chains of insulin & introduced them in the plasmids of one E.coli.
Reason (R): Chains A & B produced by this E. coli is extracted & combined by creating disulfide bonds to form insulin
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

13. **Assertion (A):** Gene therapy is a collection of methods that allows correction of a gene defect diagnosed in a child or embryo.
Reason (R): It involves delivery of normal gene into the individual or embryo to take over the function of the non functional gene.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

14. **Assertion (A):** ADA deficiency can not be cured permanently by gene therapy.
Reason (R): The genetically engineered lymphocytes are immortal only in culture conditions.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

15. **Assertion (A):** In gene therapy of SCID, a patient requires periodic infusion of genetically engineered lymphocytes.
Reason (R): If the ADA gene is introduced into cells at early embryonic stage, it could be a permanent cure.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

16. **Assertion (A):** For effective treatment of a disease, early diagnosis & understanding its pathophysiology is very important.
Reason (R): r-DNA technique, PCR & ELISA serve the purpose of early diagnosis.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

17. **Assertion (A):** ELISA is based on the principle of antigen antibody interaction.
Reason (R): Infection by pathogen can be detected by the presence of antigens or by detecting antibodies synthesized against the pathogen.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

18. **Assertion (A):** Inserting alien DNA in pBR322 plasmid at Pst I makes the transformants sensitive to ampicillin antibiotic.
Reason (R): Restrictions site for Pst I is present on ampR.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

19. **Assertion (A):** DNA ligase plays important role in recombinant DNA technology.
Reason (R): The linking of antibiotic resistant gene with plasmid vector became possible by enzyme DNA ligase.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

20. **Assertion (A):** Restriction enzymes belong to a larger class of enzymes called nucleases.
Reason (R): Each restriction enzyme recognizes a specific palindromic nucleotide sequence in the DNA
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

21. **Assertion (A):** RNA interference takes place in all eukaryotic organisms as a method of cellular defense.
Reason (R): This method involves ds RNA which prevent transcriptional process.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

22. **Assertion (A):** An alien DNA is linked with the origin of replication for making multiple identical copies.
Reason (R): An origin of replication is a specific DNA sequence which is responsible for initiating replication.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

27. Organisms and Populations

1. **Assertion (A):** Population ecology is an important area of ecology.
Reason (R): It links ecology to population genetics and evolution.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

2. **Assertion (A):** Size of population is one of the dynamic parameters of study-population characteristics.
Reason (R): Depending on food availability, predation pressure and adverse weather it keeps changing.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

3. **Assertion (A):** The logistic growth model is considered a more realistic one.
Reason (R): Resources for growth for most organism/populations are finite and become limiting sooner or later.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

4. **Assertion (A):** Exotic species introduced in new geographical area can cause havoc by rapid spreading.
Reason (R): Biotic potential of exotic species is always higher.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

5. **Assertion (A):** Predators helps in maintaining species diversity in a community.
Reason (R): Predators reduce the intensity of competition among competing prey species.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

6. **Assertion (A):** Competition is best defined as a process in which fitness (r) of one species significantly lower in presence of another species.
Reason (R): Competition leads to either short supply of resources or it shows interference.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

7. **Assertion (A):** Resource partitioning can avoid competition.
Reason (R): Resource partitioning leads to different times for feeding or different for raging patterns.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

8. **Assertion (A):** Host and parasite tend to co-evolve.
Reason (R): Many parasites have evolved to be host specific.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

9. **Assertion (A):** All parasites are tend to cause physical weakness in host.
Reason (R): Parasites might render the host more vulnerable to predation by making it physically weak.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10. **Assertion (A):** Female mosquito is not considered as parasite although it needs our blood for reproduction.
Reason (R): Parasitism is aimed to obtain either food or shelter, reproduction success is not the base of parasitism.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. **Assertion (A):** Plant and animal interactions often involve co-evolution of the mutualists.
Reason (R): Co-evolution of the mutualists is one of the safe guard against cheaters.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. **Assertion (A):** The life is interesting and most surprised phenomenon of nature.
Reason (R): It's reflected by ecological conflict and cooperation among members of a population and among populations of a community or even the molecular traffic inside a cell.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

28. Ecosystem

1. **Assertion (A):** Ecosystem can be visualized as a functional unit of nature.
Reason (R): In ecosystem not only living organisms interact among themselves but also with surrounding physical environment.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

2. **Assertion (A):** Net primary productivity is the base of life of heterotrophs.
Reason (R): Net primary productivity is the available biomass for consumption to heterotrophs.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

3. **Assertion (A):** Of this, despite occupying about 70 percent of the surface, productivity of oceans are only 55 billion tons.
Reason (R): In oceans there is poor nutrient availability in producer region.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

4. **Assertion (A):** Fragmentation is one of the important step of decomposition.
Reason (R): Fragmentation helps in leaching of water soluble organic substances & minerals.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

5. **Assertion (A):** Decomposition is largely an oxygen requiring process.
Reason (R): Oxygen leads to aerobic breakdown of organic substances hence there is complete breakdown of detritus.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

6. **Assertion (A):** In Terrestrial ecosystem much larger fraction of energy flows through the detritus food chain.
Reason (R): In an aquatic ecosystem, GFC is the major conduit for energy flow.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

7. **Assertion (A):** Detritus food chain may be connected with grazing food chain at some levels.
Reason (R): Some of the organisms of DFC are prey to the GFC animals and some of the organisms are of Omnivores in nature.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

8. **Assertion (A):** Pyramid of energy is most reliable representation of functional relationship of any ecosystem.
Reason (R): Energy flow is always unidirectional without any kind of deviation.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

9. **Assertion (A):** A given species may occupy more than one trophic level, in the same ecosystem at the same time.
Reason (R): Trophic level represents a functional level, not a species as such.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10. **Assertion (A):** Saprophytes are not given any place in ecological pyramids although they play vital role in ecosystem.
Reason (R): Saprophytes have no specific trophic level.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. **Assertion (A):** Living systems have a high degree of tendency for undergoing entropy.
Reason (R): Living systems overcome entropy by continuous input of usable or free energy.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. **Assertion (A):** In place of isolated food chain, food webs are operational in an ecosystem.
Reason (R): Absence of any species in an area does not effects the energy flow.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

13. **Assertion (A):** In an aquatic ecosystem, pyramid of biomass is inverted.
Reason (R): Biomass depends upon the reproductive potential and number of phytoplanktons.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

14. **Assertion (A):** Every biological system resist a change and wants to remain in state of equilibrium.
Reason (R): Climax communities of an ecosystem are produced after several changes it has gone through succession.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

29. Biodiversity and Conservation

1. **Assertion (A):** Nature's biological library is burning even before we catalogued the titles of all the books stocked there.
Reason (R): Large fraction of biological species faces the threat of becoming extinct even before we discover them.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

2. **Assertion (A):** In general, species diversity decreases as we move away from the equator to towards the poles.
Reason (R): From equator to pole x, environment become more constant and predictable.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

3. **Assertion (A):** Constant environments promotes greater diversity.
Reason (R): Constant environments promote niche specialization.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

4. **Assertion (A):** For species area relationship among very large area like the entire continents value of regression coefficient increase.
Reason (R): Within a region species richness increased with increasing explored area but only up to a limit.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

5. **Assertion (A):** Removal of key stone species from any ecosystem leads to destruction of entire ecosystem.
Reason (R): Keystone species drive major ecosystem functions.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

6. **Assertion (A):** Habitat loss and fragmentation is one of most important cause among evil quartet.
Reason (R): Habitat is the physical space where all the necessities of life is to be fulfilled.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

7. **Assertion (A):** Habitat fragmentation due to human activities is responsible for destruction of biodiversity.
Reason (R): Mammals and birds require large territories.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

8. **Assertion (A):** Co-extinction is also one of the evil quartet about biodiversity loss.
Reason (R): When a species become extinct, the plant and animal species, associated with it in facultative way also become extinct.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

9. **Assertion (A):** Pollination by pollinator layer is one of the broadly utilitarian service or importance of biodiversity.
Reason (R): These are such valuable services of biodiversity for which one cannot put any price tag.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

10. **Assertion (A):** However, when there are situations where an animal or plant is endangered or threatened and needs urgent measure to save it from extinction, ex-situ conservation is the desirable approach.
Reason (R): In ex-situ conservation more extensive/special care and attention can be pay on single endangered or threatened organism.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

11. **Assertion (A):** Sacred groves are also one of the mean of ex-situ conservation of biodiversity.
Reason (R): There is de-novo formation of forests, Hills or lakes for conservation of biodiversity in sacred grove category.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

12. **Assertion (A):** There are three different zones in a biosphere reserve.
Reason (R): Limited human activity is allowed in core zone.
(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
(3) (A) is true but (R) is false
(4) Both (A) and (R) are false

1. The Living World

ANSWER KEY																				
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.	1	3	1	1	2	4	1	1	3	1	1	3	1	4	4	3	2	4	1	3
Que.	**21**	**22**	**23**	**24**	**25**	**26**	**27**													
Ans.	1	2	1	1	1	2	1													

2. Biological Classification

ANSWER KEY																				
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.	1	1	1	1	1	1	1	1	3	1	1	3	4	3	1	2	1	1	1	3
Que.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**												
Ans.	2	2	3	1	1	3	2	3												

3. Plant Kingdom

ANSWER KEY																				
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.	1	3	1	1	1	1	4	1	2	1	1	1	1	1	2	3	1	2	1	1
Que.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**						
Ans.	1	1	1	3	1	1	4	2	4	1	2	2	1	1						

4. Animal Kingdom

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

5. Morphology of Flowering Plants

Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.	2	1	2	1	1	4	4	1	1	1	1	3	1	1	1	4	3	2	3	3
Que.	**21**	**22**	**23**	**24**	**24**	**24**	**24**													
Ans.	3	4	2	1	4	1	1													

6. Anatomy of Flowering Plants

ANSWER KEY																			
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.	2	1	1	1	1	1	1	1	3	1	1	1	3	1	1	4	1	3	1	1
Que.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**						
Ans.	4	1	4	1	1	3	2	1	1	1	1	1	2	1						

7. Structural Organization in Animals (Animal Tissue)

ANSWER KEY															
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Ans.	1	1	1	1	1	1	1	1	1	2	3	1	1	1	2	2

8. Cell: The Unit of Life

ANSWER KEY																				
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.	1	1	1	4	4	2	1	3	1	4	1	1	1	4	2	2	2	1	2	2
Que.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**				
Ans.	1	2	3	2	1	1	1	2	1	1	3	2	1	1	2	1				

9. Biomolecules

ANSWER KEY																				
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.	2	1	1	1	1	4	3	1	1	1	1	3	1	1	4	4	1	1	1	2
Que.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**						
Ans.	1	2	3	1	1	1	4	1	2	2	2	1	1	3						

10. Cell Cycle and Cell Division

ANSWER KEY																				
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.	1	1	4	1	1	2	3	1	1	1	2	2	1	3	2	2	2	2	1	4
Que.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**											
Ans.	4	3	3	2	1	2	2	3	2											

11. Photosynthesis in Higher Plants

ANSWER KEY																				
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.	1	2	3	4	1	4	1	1	4	1	1	1	1	1	1	1	4	1	1	1
Que.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
Ans.	1	1	2	1	1	2	2	4	1	2	2	2	1	1	2	3	1	2	1	1

12. Respiration in Plants

ANSWER KEY Chulbuli Ch@h@t																	
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
Ans.	1	1	1	1	1	1	1	1	1	1	4	1	1	2	1	4	2	2

13. Plant Growth and Development

ANSWER KEY																			
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.	1	2	1	1	1	1	1	1	1	1	2	1	3	2	1	1	1	4	1	1
Que.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**							
Ans.	1	2	4	1	3	1	1	1	3	1	1	4	2							

14. Breathing and Exchange of Gases

ANSWER KEY																				
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.	2	1	3	2	1	4	2	1	4	2	3	1	2	2	1	2	2	4	1	1
Que.	**21**	**22**	**23**	**24**	**25**															
Ans.	1	4	1	1	3															

15. Body Fluids and Circulation

ANSWER KEY																		
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
Ans.	1	4	2	2	2	2	3	2	1	1	4	2	3	4	1	2	1	1

16. Excretory Products and Their Elimination

ANSWER KEY																				
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.	1	1	1	1	3	2	4	4	2	2	2	2	2	3	1	2	1	2	3	3
Que.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**										
Ans.	2	3	2	3	3	2	1	1	1	1										

17. Locomotion and Movement

ANSWER KEY																		
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
Ans.	1	1	2	2	4	1	2	3	1	1	2	3	4	1	3	2	2	3

18. Neural Control and Coordination

ANSWER KEY																				
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.	1	1	2	1	1	1	1	1	2	2	1	1	2	3	3	3	4	3	4	2
Que.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
Ans.	3	2	3	1	1	1	1	2	1	1	4	4	3	1	3	2	1	3	2	3
Que.	**41**																			
Ans.	1																			

19. Chemical Coordination and Integration

ANSWER KEY																		
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
Ans.	2	2	3	1	3	3	3	1	1	1	3	1	4	2	4	4	1	1

20. Reproduction in Organism and Sexual Reproducing in Flowering Plants

ANSWER KEY																
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Ans.	1	1	1	4	3	1	1	3	1	1	4	3	3	1	1	1

21. Human Reproduction & Reproductive Health

ANSWER KEY																				
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.	3	1	4	2	4	3	1	3	3	4	1	1	3	3	3	3	1	1	2	1
Que.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
Ans.	3	1	3	1	1	1	4	1	1	1	3	1	4	4	3	2	1	2	3	3
Que.	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**	**51**									
Ans.	1	1	1	1	4	2	3	3	3	2	3									

22. Principles of Inheritance and Variation

ANSWER KEY																				
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.	1	2	2	1	1	2	1	1	2	2	1	3	3	1	1	3	4	1	4	2
Que.	**21**	**22**	**23**	**24**	**25**															
Ans.	1	1	1	1	1															

23. Molecular Basis of Inheritance

ANSWER KEY																				
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.	1	1	4	1	1	1	3	1	1	3	2	3	2	1	1	2	3	2	1	1
Que.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**			
Ans.	2	1	1	2	3	3	3	1	1	2	2	4	1	2	1	2	1			

24. Evolution

ANSWER KEY																				
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.	2	3	2	2	3	2	1	3	3	3	1	1	1	2	3	1	3	2	2	3
Que.	**21**	**22**	**23**	**24**	**25**	**26**	**27**													
Ans.	2	1	2	1	3	4	2													

25. Human Health and Disease

ANSWER KEY																				
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.	2	2	1	3	2	4	3	2	3	1	1	2	1	2	3	2	2	4	2	2
Que.	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
Ans.	4	3	4	2	2	2	1	2	1	1	1	2	1	2	2	4	2	1	1	2
Que.	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**					
Ans.	1	2	1	1	2	2	2	2	1	2	1	1	3	1	1					

26. Biotechnology: Principles and Processes & Biotechnology and its Applications

ANSWER KEY																				
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.	1	2	4	3	2	2	3	1	2	2	1	4	1	4	2	2	1	1	1	2
Que.	**21**	**22**																		
Ans.	3	1																		

27. Organisms and Populations

ANSWER KEY												
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Ans.	1	2	1	3	1	2	1	1	2	1	1	1

28. Ecosystem

ANSWER KEY Chulbuli Ch@h@t													
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
Ans.	1	1	1	1	1	2	1	2	1	1	2	1	3	2

29. Biodiversity and Conservation

ANSWER KEY												
Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Ans.	1	3	2	1	1	1	1	3	1	1	4	3