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'→3' DNA replicate in discontinouous manner.
Reason (R): DNA polymerase catalyse polymerization only in one direction that is 5' → 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

Directions: In the following questions, a statement of assertion is followed by a statement of reason. Mark the correct choice as:
(a) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(b) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) If Assertion is true but Reason is false.
(d) If both Assertion and Reason are false.

38. **Assertion:** Mendel used true-breeding pea lines for artificial pollination experiments for his genetic studies.
Reason: For several generations, a true-breeding line shows the stable trait inheritance and expression.

39. **Assertion :** In a monohybrid cross, F_1 generation indicate dominant characters.
Reason: Dominance occurs only in heterozygous state.

40. **Assertion:** A good example of multiple alleles is ABO blood group sytem.
Reason: When I^A and I^B alleles are present together in ABO blood group sytem, they both express their own types.

41. **Assertion:** The F_1-generation resembles both the parents in codominance.
Reason: An example is different type of red blood cells that determine ABO blood grouping in humans.

42. **Assertion :** The genetic complement of an organism is called genotype.
Reason : Genotype is the type of hereditary properties of an organism.

43. **Assertion:** In case of incomplete linkage, linked gene show new combination along with parental combination.
Reason : In case of incomplete linkage, linked genes are separated by crossing over.

44. **Assertion:** In humans, the gamete contributed by the male determines whether the child produced will be male or female.
Reason : Sex in humans is a polygenic trait depending upon a cumulative effect of some genes on X-chromosome and some on Y-chromosome.

45. **Assertion:** Aneuploidy may be of hypoploidy or hyperploidy type.
Reason: Monosomy lacks one pair of chromosomes.

46. **Assertion :** Haemophilia is a recessive sex linked disease.
Reason : Haemophilia occurs due to mutation of a structural gene on chromosome 15.

47. **Assertion:** Persons suffering from haemophilia fail to produce blood clotting factor VIII.
Reason : Prothrombin producing platelets in such persons are found in very low concentration.

48. **Assertion:** Sickle-cell anaemia is a genetically determined disorder affecting many new born babies.
Reason : It is caused by heterozygosity for allele Hb^S producing a single amino acid substitution in the α-chain of the normal haemoglobin molecule determined by allele Hb^A.

49. **Assertion :** Phenylketonuria is a recessive hereditary disease caused by body's failure to oxidize an amino acid phenylalanine to tyrosine, because of a defective enzyme.
Reason : It results in the presence of phenylalanine acid in urine.

50. **Assertion:** Due to absence of any one of the X and Y sex chromosome Turner's syndrome is caused.
Reason: Such individuals show masculine as well as feminine 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	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			

38.	39.	40.	41.	42.	43.	44.	45.	46.	47.	48.	49.	50.				
A	C	B	B	A	A	C	C	C	C	C	B	D				