Sample Paper 6

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

SOLUTIONS

1. **(a)** **2.** **(a)** **3.** **(a)**

4. **(d)** Chiropterophily is pollination by bats.

5. **(c)** **6.** **(a)** **7.** **(b)**

8. **(c)** Considering the female reproductive endocrinology, ovulation is the process of the monthly release of the viable oocyte from the ovary between the time of menarche and menopause. During this time, there is a surge in the production of LH and FSH, termed as gonadotropins, thereby initiating estradiol and progesterone secretion from the ovary. Both these hormones are very important for the menstrual cycle.

9. **(a)** The corpus luteum is a temporary endocrine structure involved in ovulation and early pregnancy. The main secretory product of corpus luteum is progesterone, which is required for the establishment and maintenance of pregnancy.

10. **(b)**

11. **(c)** Pollen grains are mostly uniporate (with single germ pore) in monocots and trip orate (with three germ pores) in dicots.

12. **(b)** The example of codominance is ABO blood grouping in humans. ABO blood groups are controlled by gene I. Gene I consists three alleles I^A, I^B and I^A and I^B are the dominant alleles. When I^A and I^B are present together, both express equally and produce the surface antigens A and B, whereas i is the recessive allele and does not produce any antigen.

The genetic effect of a single gene on multiple phenotypic traits is pleiotropy. Incomplete dominance a genetic term in which does not completely dominate another allele.

The separation of allele during the process of gametogenesis is known as Segregation. This is the basis of reappearance of recessive character in F_2-generation.

13. **(c)**

14. **(d)** Most sex-linked (X-linked) conditions are recessive. This means that person having two X-chromosomes (females), both copies of a gene (*i,e.*, one on each X-chromosome), must have a change or mutation whereas in a person with one X- chromosomes (males), only one copy or a gene must have a mutation.

A female with a mutation in one copy of a gene on the X-chromosme is said to be a 'carrier' for an X- linked condition.

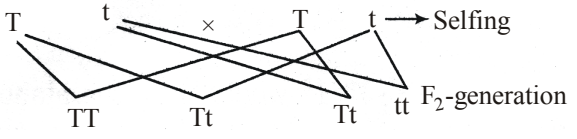
For X-linked recessive disorders, and unaffected carrier mother who has a mutation in a gene on the X-chromosome can transfer either the X- chromosome with this mutation or a normal X-chromosome to her children.

The pattern of inheritance of a condition directly or indirectly due to a dominant faulty gene located on autosome is known as autosomal dominant inheritance.

The condition caused directly or indirectly due to a recessive faulty gene copy on autosome is known as autosomal recessive inheritance.

Rare trait that is caused by single abnormal gene on the X-chromosome is called sex-linked dominant.

15. **(b)** The F_1 plants of genotype Tt are self-pollinated. (both tall (T) but with dwarf (t) alleles).



Phenotypic ratio = Tall : Dwarf
3 : 1

Genotypic ratio = Pure tall : Hybrid : Pure dwarf
1 : 2 : 3

16. **(a)** Mendel did not use pod length for his experiment.

17. **(c)** Down's syndrome is the chromosomal disorders due to the presence of an additional copy of the chromosome number 21 (trisomy of 21). The affected individual is short statured with small round head, furrowed tongue and partially open mouth and mental development is retarted.

18. **(b)**

19. **(a)** Operator gene allows the functioning of the operon.

20. **(d)**

21. **(d)** It was given by Geneticists George W. Beadle and E. L. Tatum which states that each gene in an organism controls the production of a specific enzyme. It is these enzymes that catalyze the reactions that lead to the phenotype of the organism.

22. **(d)** In the DNA molecule, there are two strands which run anti-parallel one is 5' - 3' direction and other in 3' -5' direction, the two chains are held together by hydrogen bonds between their bases. Adenine (A), a purine of one chain is exactly opposite thymine (T), a pyramidine of the other chain. Similarly, cytosine (C), a pyrimidine lies opposite guanine (G), a purine. This allows a sort of lock & key arrangement between large sized purine & small sized pyrimidine. It is strengthened by the appearance of hydrogen bonds between the two.

23. **(c)**

24. **(b)** In a DNA strand the nucleotides are linked together by 3'–5' phosphodiester linkage (bonds) to form a dinucleotide. To form a polynucleotide chain, more nucleotides can be joined.

25. **(c)** Assertion is true but Reason is false.
Success rate of test tube baby is less than 20%.

26. **(b)** Assertion and Reason are correct but Reason is not a correct explanation of Assertion.
Gene is the unit of inheritance which passes from one generation to the other through the gamete.

27. **(a)** Assertion and Reason are correct and the Reason is a correct explanation of Assertion.
9 purple and 7 white flowers are obtained in sweet pea.

28. **(c)** Assertion is correct but Reason is incorrect.
Mendel died due to kidney disorder in the year 1884 in the age of 61.

29. **(d)** **30.** **(d)** **31.** **(c)** **32.** **(b)**

33. **(a)** Copper 'T' is an intrauterine device which prevents the fertilized egg becoming implanted in the wall of the womb.

34. **(b)** **35.** **(b)**

36. **(b)**

Possible genotype of man with blood group A	×	Possible genotype of woman with blood group B
$I^A I^A$, $I^A I^O$	×	$I^B I^B$, $I^B I^O$

If the genotype is
$I^A I^O$ × $I^B I^O$
The possibility of resultant blood group may be A, B, AB and O.

37. **(b)** I^AI^O, I^BI^O - Dominant-recessive relationship
I^AI^B - Codominance
I^A, I^B & I^O - Three different allelic forms of a gene (multiple allelism)

38. **(a)** Heterosis or hybrid vigor occurs when two unrelated individuals or lines are crossed, the performance of F_1 hybrid, which is often superior to both is parents.

39. **(d)**

40. **(c)** In case of humans, the sex determining mechanism is XY type. Out of 23 pairs of chromosomes, 22 pairs are exactly same in both males and females called autosomes. A pair of X-chromosomes present in the female, whereas the presence of an X and Y chromosome are determinant of male characteristic. In case the ovum fertilises with a sperm carrying X-chromosome the zygote develops into a female (XX) and the fertilisation of ovum with Y-chromosome carrying sperm results into a male offspring.

41. **(c)** **42.** **(a)**

43. **(c)** Telomerase is a ribonucleoprotein which synthesize the rich strand of telomeres in DNA. **Telomerase** is an enzyme that adds specific DNA sequence repeats ("TTAGGG" in all vertebrates) to the 3' end of DNA strands in the telomere regions, which are found at the ends of eukaryotic chromosomes.

44. **(c)** **45.** **(d)** **46.** **(b)** **47.** **(a)** **48.** **(b)** **49.** **(b)**

50. **(c)** **51.** **(a)** **52.** **(c)** **53.** **(c)** **54.** **(b)**

55. **(a)** On the basis of the given pedigree chart of a certain family, it can be concluded that the female parent (shown by blank circle) is heterozygous where one gene is dominant and other gene is recessive.

56. **(d)** The implant is inserted under the skin of upper arm to prevent pregnancy. The implant releases hormones that keep ovaries from releasing eggs and thicken cervical mucus, which helps to block sperm from getting to the egg in the first place.

57. **(a)** The structures marked in the figure of mammary gland are A–mammary lobe, B–mammary duct, C–ampulla, and D–lactiferous duct. The mammary gland is a gland located in the breasts of females that is responsible for lactation. Mammary glands only produce milk after childbirth. Mammary lobe (A) contains clusters of cells called alveoli which secrete milk which is stored in the cavities of alveoli.

58. **(c)** **59.** **(d)** **60.** **(b)**