Sample Paper 8

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

SOLUTIONS

1. **(a)** Secondary nucleus of an embryo sac of angiosperms is diploid because two nucleus comes from each pole to the centre and they become fuse.

2. **(d)** Pollen grains represent the male gametophyte. The outer part of the pollen is exine, which is composed of a complex polysaccharide, sporopollenin. Inner part is intine. The cell contains vegetative cell which develop into the pollen tube and germ pore and generative cell (degenerative) are also present.

3. **(b)** Artificial hybridization is process in which only derived pollen grain are used for pollination. The correct sequence in artificial hybridization experiment in bisexual flower is:
Emasculation → Bagging → Cross-pollination → Rebagging
Emasculation is the removal of the anthers of a flower in order to prevent self-pollination or the undesirable pollination of neighbouring plants. After that emasculated male and female plants are kept in isolation by enclosing them in a bag in a process called bagging. When the stigma of bagged flowers attains receptivity, mature pollen grains collected from anthers of the male parent are dusted on the stigma, and the flowers are rebagged and the fruits allowed develop.

4. **(a)** The portion of embryonal axis above the level of cotyledons is the epicotyl which terminates with the plumule or stem tip.

5. **(d)** Nucellar embyo in apomictic diploid. Apomixis is a form of asexual reproduction that produce seeds without fertilisation. In this technique, embryo is formed by some other tissue without fertilisation. e.g. Nucellar or Integuments.

6. **(d)** In human beings, menstrual cycles ceases around 50 years of age; that is termed as menopause.

7. **(d)** Ovum contains the haploid set of chromosomes with one of the X chromosomes. The haploid set of chromosomes in the male gamete, sperm has either the X or Y chromosome. Thus, the sex of the foetus depends on the male gamete fertilizing the ovum.

8. **(b)** The given figure shows the sectional view of seminiferous tubule. The seminiferous tubules are the site of the germination, maturation, and transportation of the sperm cells within the male testes.

9. **(d)**

10. **(b)** In wind pollination, flowers have large, feathery stigma to easily trap air-borne pollen grains.

11. **(a)** Chasmogamy is a process of pollination that occurs in opened flowers. It is of two types *i.e.*, **self-pollination** (autogamy) and **cross-pollination**. Cross-pollination is of two types *i.e.*, **geitonogamy** and **xenogamy**.
So, we can say that chasmogamous flowers exhibit both autogamy (self-pollination) and allogamy (cross-pollination). While, in cleistogamous flower, the anthers and stigma lie close to each other within the closed flowers. Thus, these flowers are invariably autogamous as there is no chance of cross-pollen landing on the stigma.

12. **(c)** **13.** **(b)**

14. **(d)** Since haemophilia is an X linked disease it can be predicted that haemophilia would have occurred in more male than female descendants due to criss cross inheritance. Haemophilia (also known as bleeder disorder) is a sex linked recessive disease which occurs due to deficiency of plasma thromboplastin or antihaemophilia globulin during which

the exposed blood does not clot. It transfers from unaffected carrier female to some of the male progeny. The possibility of female becoming a haemophilic is extremely rare because mother of such female has to be at least carrier and the father should be haemophilic.

15. **(b)** Allele for wrinkled shape of seed in garden pea plant is considered to be recessive because the trait (character) associated with the allele is not expressed in heterozygotes.

16. **(a)** The changes in chromosome number by additions or deletions of less than a whole set is aneuploidy.

17. **(b)**

18. **(c)** Two nucleotides are linked through 3' – 5' phosphodiester linkage to form a dinucleotide. The chromatin that is more densely packed and stains dark is called heterochromatin.

19. **(c)** The process of protein synthesis is catalyzed by ribosomal RNA. Messenger RNA provides the genetic blueprint for the protein. Transfer RNA is responsible for translating the triplet code into a specific amino acid. Messenger RNA molecules are modified prior to protein synthesis by small nuclear RNA.

20. **(b)** Human Genome Project (HGP) is closely associated with the rapid development of a new area in biology called bioinformatics which is used for storage and analysis of enormous amount of data.

21. **(c)** Single nucleotide polymorphism (SNP) is the most common type of genetic variation among people. Each SNP represents a difference in a single DNA building block, called a nucleotide.

22. **(b)** The coding sequence or expressed sequences are defined exons. The exons appear in mature or processed RNA and are interrupted by introns or intervening sequence which do not appear in mature or processed RNA.

23. **(c)**

24. **(d)** The first genetic material was considered as RNA.
It acts as a genetic material as well as catalyst (there are some important biochemical reactions in living systems that are catalysed by RNA catalysts and not by protein enzymes). But, RNA being a catalyst was reactive and hence unstable and not by protein enzymes).
Therefore, DNA has evolved from RNA with chemical modifications that make it more stable.

25. **(b)** Both Assertion and Reason are true, but Reason is not the correct explaination of Assertion.
In GIFT the gametes (each egg and sperm) are then injected into the fallopian tube using a surgical operation known as laparoscope. The doctor will use usual anesthesis. While in ZIFT fertile eggs are implanted inside the uterus and become fetus via the same process.

26. **(c)** Assertion is true but Reason is false.
Amniocentesis can be used to detect the chromosomal abnormalities in the developing embryo. Hence in India, it has statutary ban.

27. **(d)** Assertion and Reason are false.
No more oogonia are formed and added after birth. These cells start division and enter into prophase II of the meiotic division and get temporarily arrested at that stage, called primary oocytes.

28. **(b)** Assertion and Reason are correct but Reason is not a correct explanation of Assertion.
Cry-du-chat syndrome is caused by the deletion in short arm of chromosome number 5

29. **(a)** The given figure is that of copper CuT. CuT is a simple copper releasing IUD made of a flexible, "T" shaped piece of plastic wrapped with a thin copper containing wire. It makes the uterus and fallopian tubes produce fluid that kills sperm. This fluid contains white blood cells, copper ions, enzymes, and prostaglandins. Copper ions prevent pregnancy by inhibiting the movement of sperm, because the copper-ion-containing fluids are directly toxic to sperm.

30. **(a)** Mammary glands or breasts are modified sweat glands that lie over the pectoral muscles. Each breast has a broad multiporous tip called nipple for the release of milk. A circular pigmented area called areola lies below it. Each breast contains 15-20 glandular lobes separated from one another by dense connective tissue and adipose tissue. Each lobe is further made of a number of lobules having glandular or secretory alveoli. The cells of alveoli produce milk which is stored in the cavities or lumens of alveoli. Alveoli open into mammary tubules and them into mammary ducts. Mammary ducts form a mammary ampulla from which a lactiferous duct develops. Each lobe produces a separate lactiferous duct. The various lactiferous ducts open at the nipple by separate pores.

31. **(a)** Statement in option (a) is incorrect because the alcurone cells are characterized by the presence of thick walls and non-vacuolated cytoplasm intere connected by plasmodumata. Alcurone layers are surrounded by a single membrane which is closely associated with sphaerosomes.

32. **(b)** Ogenesis is the process of formation of a mature female gamete. Unlike sperm formation that starts at puberty, egg formation begins before birth. Primordial germ cells complete the proliferative stage of oogenesis in the early embryonal state when million of gamete mother cells (oogonia) are formed within each faetal ovary, no more oogonia are formed and added after birth.

33. **(d)**

34. **(d)** Condoms are used as barriers made of thin rubber/ latex sheath used to cover the penis in the male or vagina and cervix in females. It prevents the deposition of ejaculated semen into the vagina of the female. It should be discarded after a single use. It is also a safe guard against transmission of AIDS and other Sexually Transmitted Diseases (STDs).

35. **(a)** The portion of embryonal axis above the level of cotyledons is the epicotyl which terminates with the plumule or stem tip.

36. **(b)** Recessive mutation is carried by heterozygous carrier individuals. This is why they do not get eliminated from the gene pool.

37. **(b)** Klinefelter's syndrome is a genetic disorder that affects males. This syndrome occurs when a boy is born with one or more extra X chromosomes due to union of non-disjunct XX egg and a normal sperm, or nondisjunct XY sperm with a normal egg. Having an extra X chromosome can cause a male to have some physical traits unusual for males.

38. **(b)** Autosomal recessive is a type of disorder in which two copies of an abnormal gene must be found for the disease in the affected person.

39. **(c)** (Previous year)

Parents	X^cY	×	X^cX
gametes	X^2Y	×	X^cX
F_1 generation	X^cXC^c		$X^cX^cX^cY$ X^cY

50% of the male children will be colour blind.

40. **(c)** Pleotropy is a phenomenon in which a single gene may express more than one trait. Sometimes, one trait will be very evident and other will be less evident, *e,g*., a gene for white eye in Drosophila also affect the shape of organs in male responsible for sperm storage as well as other structures.

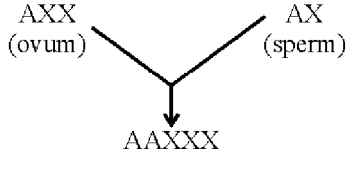
Multiple allelism is a series of three or more alternative or allelic forms of a gene, that can occupy the same locus.

Mosaicism is the occurrence of cells that differ in their genetic component from other cells of the body.

Polygeny refers to a single characteristics that is controlled by more than two genes. (It is also known as multifactorial inheritance).

41. **(a)**

42. **(a)** A human baby having abnormality with 'XXX' sex chromosomes is born due to evolution of abnormal ova in mother's ovary. This is caused due to non-disjunction of X chromosome in the mother.



43. **(c)** When two genes in a dihybrid cross are situated on the same chromosome, the proportion of parental gene combinations are much higher than the non-parental or recombinant type. This is also called as incomplete linkage.

44. **(a)** Inducible system includes a repressor protein which is bound to DNA in the absence of any other factor.

45. **(a)** The diameter of the strand always constant due to a pairing of purine (adenine and guanine) and pyrimidine (cytosine and thymine). The specific bonding gives uniformity and keep strands together.

46. **(c)** Exchange of chromatid segments between the non-sister chromatids of a bivalent is called crossing over. It occurs during pachytene of prophase I. It is responsible for recombination of linked genes.

47. **(d)** In 1953 **James Watson** and **Francis Crick**, based on the X-ray diffraction data proposed a double helix model of DNA.

Erwin chargaff observed that, in double-stranded DNA, the ratios between adenine and thymine and guanine and cytosine are constant and equal. **Matthew Meselson** and **franklin stahl** in 1958 performed experiments on *E. Coli* to prove that DNA replicates semiconservatively. But had no contribution it the development of double helix model.

48. **(b)** The given diagrams represent the process of transcription in bacteria.

In diagram (i), RNA polymerase binds to the DNA of the gene at a region called promoter and initiates the transcription, hence this process is termed as initiation. In diagram (ii), the polymerase reaches the terminator region, the nascent RNA and RNA polymerase falls off. This results in termination of transcription. Diagram (iii) represents the process of elongation which begins with the release of the s subunit from the polymerase. This results in the synthesis of mRNA (5'–3' direction) called elongation.

49. **(d)**

50. **(a)** IUDs are Intra Uterine Devices inserted by Doctor into the female uterus through vagina. It increase the phagocytosis of sperms in uterus & Cu reduce the motility & fertility capacity of sperms.

51. **(a)** The action of contraceptive is inhibition of follicular development, ovulation and fertilisation.

52. **(a)** **53.** **(c)** **54.** **(a)**

55. **(a)** In the given figure of lac operon model (proposed by Jacob and Monad), the labels A, B, X, Y and Z are respectively repressor, inducer, β- galactosidase (*z*), permease (*y*), transacetylase (*a*). *z*, *y* and a are three structural genes which produces three enzymes for the degradation of lactose to glucose and galactose. Label X (β-galactosidase) is primarily responsible for the hydrolysis of disaccharide lactose into galactose and glucose.

56. **(d)** The given figure is a contraceptive implant. It is a small flexible tube which is inserted under the skin (typically the upper arm) and prevents pregnancy by releasing hormones that prevent ovaries from releasing eggs and by thickening cervical mucus.

57. **(d)** Anatropous ovule is a completely inverted ovule turned back 180 degrees on its stalk.

58. **(c)** A-Vas deferens B- Seminal vesicle, C- Prostate, D- Bulbourethral gland.

59. **(c)** Figure (c) refers to blastocysts stage. Blastocyst is embedded in the uterine endometrium by a process called implantation and leads to pregnancy. It possesses an inner cell mass (ICM) which subsequently forms the embryo. The outer layer of the blastocyst consists of cells collectively called the trophoblast. This layer surrounds the inner cell mass and a fluid-filled cavity known as the blastocoel. The trophoblast gives rise to the placenta.

60. **(a)** The pedigree chart shows the inheritance of a condition like phenylketonuria as an autosomal recessive trait. Parents need to be heterozygous as two of their children are known to be sufferer of the disease. It cannot be recessive sex linked inheritance because then the male parent would also be a sufferer.