Sample Paper

8

Time : 90 Minutes **Max. Marks : 50**

General Instructions

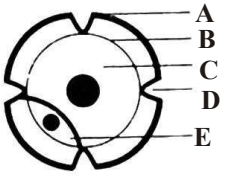
1. *The Question Paper contains three sections.*
2. ***Section A** has **24** questions. Attempt any **20** questions.*
3. ***Section B** has **24** questions. Attempt any **20** questions.*
4. ***Section C** has **12** questions. Attempt any **10** questions.*
5. *All questions carry equal marks.*
6. *There is no negative marking*

SECTION-A

DIRECTION: *This section consists of 24 questions. Attempt any 20 questions from this section. The first attempted 20 questions would be evaluated.*

1. Secondary nucleus in the middle of an embryo sac of angiosperms is
(a) diploid (b) triploid (c) tetraploid (d) haploid

2. In the given figure of pollen grain tetrad, identify the parts marked as A, B, C, D and E.



(a) A - Germ pore, B - Generative cell, C - Intine, D - Exine, E - Vegetative cell
(b) A - Germ pore, B - Generative cell, C - Exine, D - Intine, E - Vegetative cell
(c) A - Intine, B - Exine, C - Germ pore, D - Generative cell, E - Vegetative cell
(d) A - Exine, B - intine, C - Vegetative cell, D - Germ pore, E - Generative cell

3. For artificial hybridization experiment in bisexual flower, which of the following sequences is correct?
(a) Bagging → Emasculation → Cross-pollination → Rebagging
(b) Emasculation → Bagging → Cross-pollination → Rebagging
(c) Cross-pollination → Bagging → Emasculation → Rebagging
(d) Self-pollination → Bagging → Emasculation → Rebagging

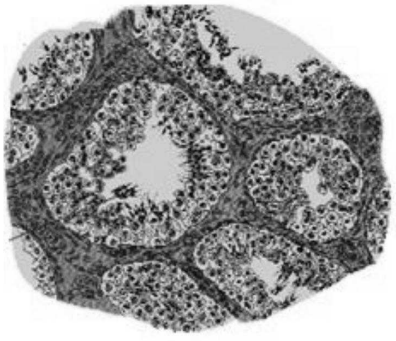
4. The portion of embryonal axis between plumule & cotyledons is called
(a) epicotyl (b) hypocotyl (c) coleoptile (d) coleorhize

5. Nucellar embryo is
(a) amphimictic haploid (d) amphimictic diploid
(c) apomictic haploid (d) apomictic diploid

6. In human female, menopause is a stage in which
(a) oogenesis starts at puberty.
(b) menstruation starts at puberty.
(c) corpus luteum starts secreting progesterone for maintaining pregnancy.
(d) menstruation stops at the age of 50 years and reproductive capacity is arrested.

7. Presence of XX or XY chromosomes in zygote depends on
(a) the sperm carrying X chromosome fertilized the ovum.
(b) the sperm carrying Y chromosome fertilized the ovum.
(c) the sperm without any chromosome fertilized the ovum.
(d) the sperm carrying X or Y chromosomes fertilized the ovum.

8. Identify the figure (A) whose sectional view is given below and match with its characteristics (B) and its location (C).



	A	B	C
(a)	Graafian follicle	Involved in the formationof ovum	Ovary
(b)	Seminiferous tubule	Involved in the formationof sperm	Testis
(c)	Ovum surrounded by sperm	Process of fertilization	Graafian follicle
(d)	Mammary gland	Involved in milk secretion	Female reproductive system

9. If one ovary of 30 year old lady is removed surgically then what happens in affected lady?
(a) Menstrual cycle is stopped
(b) Menstrual cycle is normal but ovulation does not occur
(c) Duration of menstrual cycle is prolonged
(d) No effect on menstrual cycle

10. In which type of flowers, stigma is rough and sticky?
(a) Insect pollinated (b) Wind pollinated (c) Water pollinated (d) All of above

11. Choose the correct statement from the following.
(a) Cleistogamous flowers always exhibit autogamy.
(b) Chasmogamous flowers always exhibit geitonogamy.
(c) Cleistogamous flowers exhibit both autogamy and geitonogamy.
(d) Chasmogamous flowers never exhibit autogamy.

12. Crossing over in diploid organisms is responsible for
(a) dominance of genes (b) linkage between genes
(c) recombination of linked genes (d) segregation of alleles

13. Refer the given statements and select the correct option.
(i) Percentage of homozygous dominant individuals obtained by selfing Aa individuals is 25%.
(ii) Types of genetically different gametes produced by genotype AABbcc are 2.
(iii) Phenotypic ratio of monohybrid F_2 progeny in case *Mirabilis jalapa* is 3 : 1.
(a) All the statements are true.
(b) Statements (i) and (ii) are true, but statement (iii) is false.
(c) Statements (i) and (iii) are true, but statement (ii) is false.
(d) Statements (ii) and (iii) are true, but statement (i) is false.

14. It is well known that Queen Victoria of England was a carrier for haemophilia. Since this is an X-linked disease, it can be predicted that
(a) all of her sons would have had disease.
(b) all her daugthers would have been carriers.
(c) her father must definitely have had haemophilia.
(d) haemophilia would have occurred in more of her male than her female descendents.

15. Why is the allele for wrinkled seed shape in garden peas considered recessive ?
(a) It "recedes" in the F_2 generation when homozygous parents are crossed.
(b) The trait associated with the allele is not expressed in heterozygotes.
(c) Individuals with the allele have lower fitness than that of individuals with the dominant allele.
(d) The allele is less common than the dominant allele. (The wrinkled allele is a rare mutant).

16. Conditions of a karyotype 2n ±1 and 2n ± 2 are called
(a) aneuploidy (b) polyploidy (c) Allopolyploidy (d) monosomy

17. A dwarf pea plant was treated with GA. The plant became tall. The treated plant was then crossed with a homozygous tall pea. The results in F2 are expected to be
(a) all tall (b) tall and dwarf in 3 : 1 ratio (c) 50% tall (d) all dwarf

18. Read the following statements and choose the **incorrect** statements.
(i) Nitrogenous base is linked to the pentose sugar through a N-glycosidic linkage.
(ii) Phosphate group is linked to 5′–OH of a nucleoside through phosphoester linkage.
(iii) Two nucleosides are linked through 3′–5′N-glycosidic linkage.
(iv) Negatively charged DNA is wrapped around positively charged histone octamer to form nucleosome.
(v) The chromatin that is more densely packed and stains dark is called euchromatin.
(a) (i) only (b) (iv) only (c) (iii) and (v) (d) (i), (ii) and (iii)

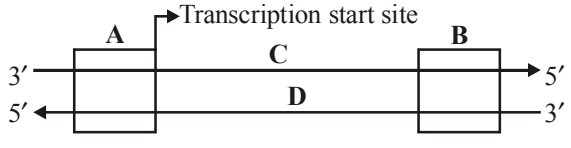
19. What role does messenger RNA play in the synthesis of proteins ?
(a) It catalysis the process.
(b) It translates the genetic code to a specific amino acid.
(c) It provides the genetic blue print for the protein.
(d) It modifies messenger RNA molecules prior to protein synthesis.

20. Human Genome Project (HGP) is closely associated with the rapid development of a new area in biology called as
(a) biotechnology (b) bioinformatics (c) biogeography (d) bioscience

21. SNP which is pronounced as "snips" stands for
(a) Small Nuclear Protein
(b) Single Nucleotide Particle
(c) Single Nucleotide Polymorphism
(d) Small Nicking Points

22. With regard to mature mRNA in eukaryotes
(a) exons and introns do not appear in the mature RNA
(b) exons appear but introns do not appear in the mature RNA
(c) introns appear but exons do not appear in the mature RNA
(d) Both exons and introns appear in the mature RNA

23. Given diagram represents the schematic structure of a transcription unit with some parts labelled as A, B, C and D. Select the option which shows its correct labelling.



	A	B	C	D
(a)	Terminator	Promoter	Template strand	Coding strand
(b)	Promoter	Terminator	Coding rand	Template strand
(c)	Promoter	Terminator	Template strand	Coding strand
(d)	Terminator	Promoter	Coding strand	Template strand

24. The first genetic material could be
(a) Protein (b) Carbohydrates (c) DNA (d) RNA

SECTION-B

DIRECTION: *This section consists of 24 questions (Sl. No.25 to 48). Attempt any 20 questions from this section. The first attempted 20 questions would be evaluated.*

Question No. 25 to 28: *Consist of two statements Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:*

(a) If both Assertion and Reason are True and the Reason is a correct explanation of the Assertion.
(b) If both Assertion and Reason are True but Reason is not a correct explanation of the Assertion.
(c) If the Assertion is True but Reason is False.
(d) If both Assertion and Reason are False.

25. **Assertion:** Transfer of an ovum collected from a donor into the fallopian tube of another female who cannot produce an ovum is called GIFT.
Reason: Transfer of early embryo with up to 8 blastomeres into the fallopian tube of the female, is called ZIFT.

26. **Assertion:** Amniocentesis is a foetal sex determination test based on the chromosomal pattern in the amniotic fluid surrounding the developing embryo.
Reason: Amniocentesis is presently completely banned in India.

27. **Assertion:** The oogonia are continuously formed and added after birth.
Reason: These cells start division and enter into prophase of the mitotic division and get temporarily arrested at that stage called primary oocyte.

28. **Assertion:** The affected infant with cry-du-chat syndrome has a round, moon-like face, and utter feable, plaintime cries similar to the mewing of cat.
Reason: Deletion of a part of 21 chromosome produces leukemia, a cancerous malignancy arising in farming tissue.

29. The given figure shows one of the elements releasing intrauterine device. Select the option which shows the correct identification of the device and its feature.

(a) CuT; suppress sperm motility and its fertilizing capacity.
(b) Cu7; make uterus unsuitable for the attachment of blastocysts.
(c) Lippes loop; protect the users from contracting AIDS and STDs.
(d) LNG - 20; acts as spermicidal means and decrease the contraceptive efficiency.

30. Milk secreted from the cells of the alveoli of mammary lobes reach nipple through lactiferous duct (L), mammary duct (M), mammary tubule (T) and mammary ampulla (A) in the following order:
(a) TMAL (b) MTLA (c) MTAL (d) ATML

31. In cereals, one or few outermost layers of the endosperm become highly specialised morphologically and physiologically and constitute the aleurone tissue. Which of the following statements regarding aleurone tissue (or aleurone cells) is incorrect?
(a) Aleurone cells are characterised by the presence of thin walls and vacuolated cytoplasm with single small nucleus.
(b) Aleurone grains, rich in proteins are proteins are present in these cells.
(c) Aleurone grains present in aleurone cells are closely associated with sphaerosomes
(d) During seed germination, the reserve food of endosperm is digested by the activity of certain hydrolytic enzymes secreted by aleurone cells.

32. Identify the wrong statement from the following.
(a) High levels of estrogen triggers the ovulatory surge.
(b) Oogonial cells start to proliferate and give rise to functional ova in regular cycle from puberty onwards.
(c) Sperms released from seminiferous tubules are poorly motile/non-motile.
(d) Progesterone level is high during the post ovulatory phase of menstrual cycle.

33. Which of the following can be used as emergency contraceptive within 72 hours of coitus to avoid possible pregnancy due to rape or casual unprotected intercourse?
(a) Progestogens
(b) Progestogens-estrogen combinations
(c) Condoms
(d) both (a) and (b)

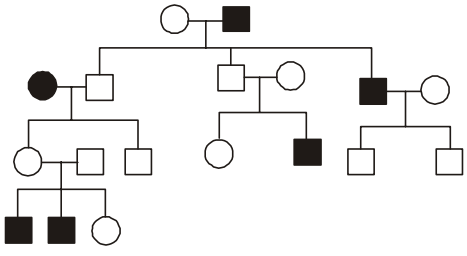
34. Condoms are one of the most popular contraceptives because of the following reasons
(a) these are effective barriers for insemination
(b) they do not interfere with coital act
(c) these help in reducing the risk of STDs
(d) All of the above

35. The portion of embryonal axis between plumule & cotyledons is called
(a) epicotyl (b) hypocotyl (c) coleoptile (d) coleorhize

36. Harmful mutations does not get eliminated from gene pool because
(a) they are recessive and carried by homozygous individuals.
(b) they are recessive and carried by heterozygous individuals.
(c) they are formed repeatedly.
(d) they show genetic drift.

37. Extra chromosome 'X' is present in which one of the following cases?
(a) Down syndrome (b) Klinefelter syndrome
(c) Turner syndrome (d) Bleeder's disease

38. In the following human pedigree, the filled symbols represent the affected individuals. Identify the type of given pedigree.



(a) X- linked recessive (b) Autosomal recessive (c) X-linked dominant (d) Autosomal dominant

39. A man whose father was colour blind marries a woman who had a colour blind mother and normal father. What percentage of male children of this couple will be colour blind?
(a) 25% (b) 0% (c) 50% (d) 75%

40. Occasionally, a single gene may express more than one effect. The phenomenon is called
(a) multiple allelism (b) mosaicism (c) pleiotropy (d) polygeny

41. A tall true breeding garden pea plant is crossed with a dwarf true breeding garden pea plant. When the F_1 plants were selfed, the resulting genotypes were in the ratio of
(a) 1 : 2 : 1 :: Tall homozygous : Tall heterozygous : Dwarf
(b) 1 : 2 : 1 :: Tall heterozygous : Tall homozygous : Dwarf
(c) 3 : 1 : : Tall : Dwarf
(d) 3 : 1 : : Dwarf : Tall

42. An abnormal human baby with 'XXX' sex chromosomes was born due to
(a) formation of abnormal ova in the mother
(b) fusion of two ova and one sperm
(c) fusion of two sperms and one ovum
(d) formation of abnormal sperms in the father

43. In a testcross involving F_1 dihybrid flies, more parental-type offspring were produced than the recombinant-type offspring. This indicates
(a) the two genes are located on two different chromosomes.
(b) chromosomes failed to separate during meiosis.
(c) the two genes are linked and present on the same chromosome.
(d) both of the characters are controlled by more than one gene.

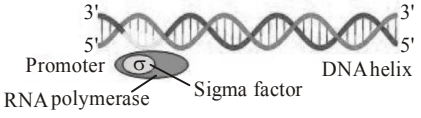
44. Which of the following would you expect to find in an inducible system ?
(a) A repressor protein, which is bound to DNA in absence of any other factor.
(b) A repressor protein, which is bound to DNA in the presence of a co-repressor.
(c) An activator protein, which is bound to DNA in the absence of any other factor.
(d) An activator protein, which is bound to DNA only in the absence of air inhibitor.

45. The fact that a purine always paired base through hydrogen bonds with a pyrimidine base leads to, in the DNA double helix.
(a) the antiparallel nature
(b) the semiconservative nature
(c) uniform width throughout DNA
(d) uniform length in all DNA

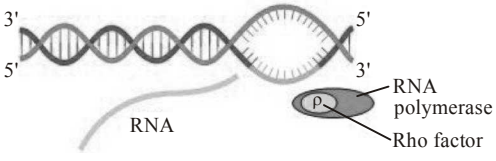
46. Discontinuous synthesis of DNA occurs in one strand, because
(a) DNA molecule being synthesised is very long
(b) DNA dependent DNA polymerase catalyses polymerisation only in one direction (5′→3′)
(c) It is a more efficient process
(d) DNA ligase has to have a role

47. Who amongst the following scientists had no contribution in the development of the double helix model for the structure of DNA ?
(a) Rosalind franklin (b) Maurice Wilkins (c) Erwin Chargaff (d) Meselson and Stahl

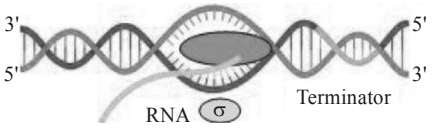
48. (i)



(ii)



(iii)



Identify (i), (ii) and (iii).
(a) (i) Elongation, (ii) Termination, (iii) Initiation
(b) (i) Initiation, (ii) Termination, (iii) Elongation
(c) (i) Initiation, (ii) Elongation, (iii) Termination
(d) (i) Termination, (ii) Elongation, (iii) Initiation

SECTION-C

DIRECTION: *This section consists of one case followed by 6 questions linked to this case (Q.No.49 to 54). Besides this, 6 more questions are given. Attempt any 10 questions in this section. The first attempted 10 questions would be evaluated.*

A newly married couple was afraid of using contraceptive and IUDs. So they opted for natural method of contraception. During a random councelling session, the couple found that natural contraception is not reliable, instead they can use barrier contraceptive.

49. Natural method of birth control include
(a) Abstinence (b) Lactational amenorrhoea
(c) Coitus interrupts (d) All of these

50. Which one of the following is the most widely accepted method of contraception in India, as at present?
(a) IUD (b) Cervical cap (c) Tubectomy (d) Diaphragms

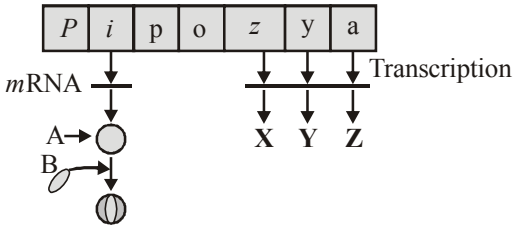
51. The action of contraceptive is
(a) prevention of ovulation and fertilisation
(b) prevent ovulation only
(c) prevent rapid passing of eggs in the oviduct
(d) prevention of ovulation, implantation and fertilization only.

52. Which is the hormonal method of birth control?
(a) Pill (b) Vasectomy (c) Copper IUD (d) Femidom

53. What is the function of copper T?
(a) stop oblituation of the blastocoel (b) checks mutation
(c) stops fertilisation (d) stop zygote formation

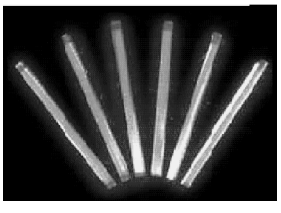
54. Find out correct choice for IUD.
i. Induces phagocytosis of sperms.
ii. Sperm motility and fertilising capacity of sperms is suppressed by the release Cu^{2+} ions.
iii. Make the uterus unsuitable for implantation.
(a) i, ii and iii (b) i and ii (c) Only i (d) None of the above

55. The given figure shows *lac* operon model and its functioning. Select the option which correctly labels A, B, X, Y and Z marked in the figure and also identify the label which is primarily responsible for the hydrolysis of the disaccharide, lactose, into galactose & glucose.



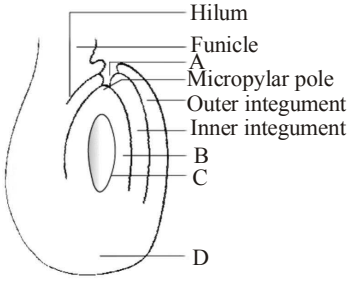
	A	B	X	Y	Z	L
(a)	Repressor	Inducer	β-Galacto-sidase	Permease	Trans-acetylase	X
(b)	Repressor	Inducer	Permease	β-Galacto-sidase	Trans-acetylase	Y
(c)	Inducer	Repressor	β-Galacto-sidase	Permease	Trans-acetylase	Z
(d)	Inducer	Repressor	β-Galacto-sidase	Trans-acetylase	Permease	B

56. Which of the following option is correct regarding the diagram given below?



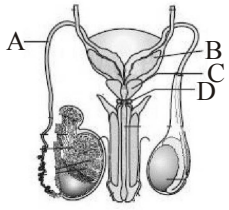
(a) It is a device made of rubber and inserted into the female reproductive tract to cover the cervix during coitus.
(b) It is a device made of thin rubber/ latex sheath and are used to cover penis in the male.
(c) This device is inserted by doctors in the uterus through vagina and increases phagocytosis of sperms within the uterus.
(d) It is a set of 6-small plastic capsules (called implant) which are placed under the skin of a women's upper arm and it prevent pregnancy.

57. The given figure shows a diagrammatic view of a typical anatropous ovule, in which some parts are typical anatropous ovule, in which some parts are marked as A, B, C, & D. Identify the correct labelling of A, B, C & D from the options given below.



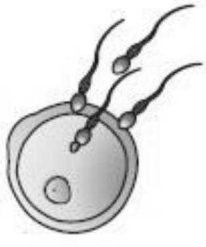
(a) A – Chalazal pole; B – Micropyle; C – Embryo sac; D –Nucellus
(b) A – Micropyle; B – Chalazal pole; C – Embryo sac; D – Nucellus
(c) A – Micropyle; B – Chalazal pole; C – Nucellus; D – Embryo sac
(d) A – Micropyle; B – Nucellus; C – Embryo sac; D – Chalazal pole

58. Given below is a diagrammatic sketch of a portion of human male reproductive system. Select the correct set of the names of the parts marked as A, B, C, and D.

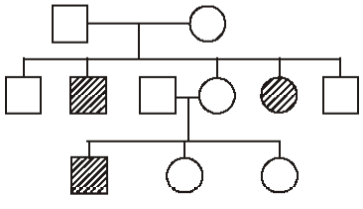


	A	B	C	D
(a)	Ureter	Seminal vesicle	Prostate	Bulbourethral gland
(b)	Ureter	Prostate	Seminal vesicle	Bulbourethral gland
(c)	Vas deferens	Seminal vesicle	Prostate	Bulbourethral gland
(d)	Vas deferens	Seminal vesicle	Bulbourethral gland	Prostate

59. Which of the following human developmental stage becomes embedded in the uterine endometrium by a process called implantation and leads to pregnancy?

(a)  (b)  (c)  (d) 

60. Study the pedigree chart given below and choose its correct representation.



(a) Inheritance of a condition like phenylketonuria as an autosomal recessive trait.
(b) The pedigree chart is wrong as this is not possible.
(c) Inheritance of a recessive sex-linked disease like haemophilia.
(d) Inheritance of a sex-linked inborn error of metabolism like phenylketonuria.

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.

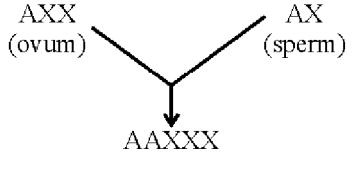
Multiple allelism is a series of three or more alternative or allelic forms of a gene, that can occupy the same locus.

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.