Sample Paper

1

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

General Instructions

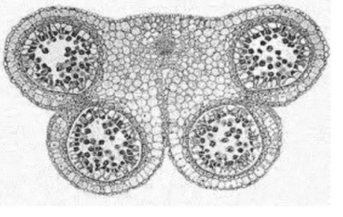
1. *The Question Paper contains three sections.*
2. ***Section A** has **24** questions. Attempt any **20** questions.*
3. ***Section B** has **24** questions. Attempt any **20** questions.*
4. ***Section C** has **12** questions. Attempt any **10** questions.*
5. *All questions carry equal marks.*
6. *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. How many pollen grains will be formed after meiotic division in ten microspore mother cells?
(a) 10 (b) 20 (c) 40 (d) 80

2. A typical angiospermic anther is

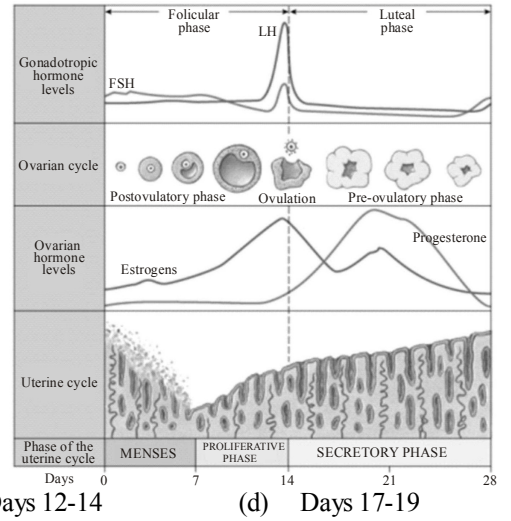


(a) Bilobed (b) unilobed (c) Trilobed (d) Tetralobed

3. Male gametes or sperms are developed from generative cell by
(a) meiotic division (b) mitotic division (c) amitotic division (d) None of these

4. Pollen grain is liberated in
(a) one celled stage (b) two celled stage (c) three celled stage (d) two or three celled stage

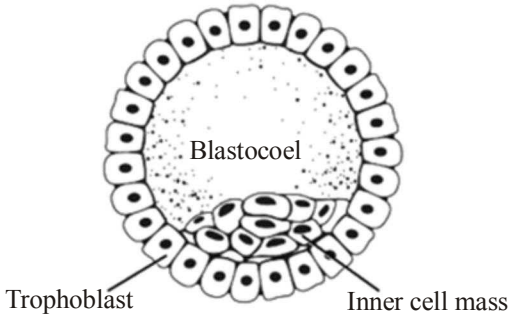
5. In a normal 28 day menstrual cycle, when would you expect the LH surge to occur?



(a) Days 8-10 (b) Days 12-14 (d) Days 17-19 (d) Days 21-28

6. Which one of the following is not the function of placenta? It:
(a) secretes estrogen.
(b) facilitates removal of carbon dioxide and waste material from embryo.
(c) secretes oxytocin during parturition.
(d) facilitates supply of oxygen and nutrients to embyo.

7. The first week of human development is characterized by formation of the:

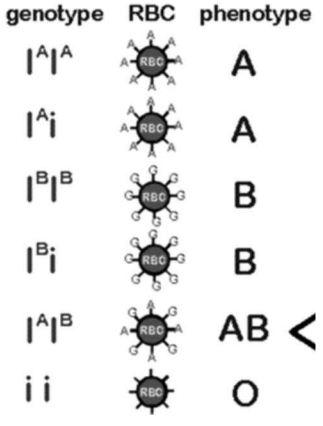


(a) inner cell mass (b) hypoblast (c) trophoblast (d) blastocyst

8. Seminal plasma, the fluid part of semen, is contributed by
I. Seminal vesicle II. Prostate III. Urethra IV. Bulbourethral gland
(a) I and II (b) I, II and IV (c) II, III and IV (d) I and IV

9. Choose the incorrect statement from the following
(a) In birds and mammals internal fertilisation takes place
(b) Colostrum contains antibodies and nutrients
(c) Polyspermy mammals is prevented by the chemical changes in the egg surface
(d) In the human female implantation occurs almost seven days after fertilisation

10. A child is born to a mother whose blood group is A and a father whose blood group is B. The child is of blood group A. According to this which of the following is true?



(a) The mother has Bombay blood group
(b) The child's father is some other man
(c) This is a normal case
(d) The child has genotype I^A/i

11. Male gametophyte of angiosperms/monocots is
(a) Microsporangium (b) Nucellus (c) Microspore (d) Stamen

12. Which of the following is not a hereditary disease?
(a) Cystic fibrosis (b) Thalassemia (c) Haemophilia (d) Cretinism

13. The gene of sickle cell anaemia is inherited by
(a) Blood cells (b) Bone cells (c) Sex chromosomes (d) Autosomes

14. Which one of the following traits of garden pea studied by Mendel was a recessive feature ?
(a) Round seed shape (b) Axial flower position (c) Green seed colour (d) Green pod colour

15. Sex determination in grasshoppers, humans, and *Drosophila* is similar because
(a) females are hemizygous.
(b) males have one X chromosome and females have two X chromosomes.
(c) all males always have one Y chromosome in all three species.
(d) the ratio of autosomes to sex chromosomes is the same in all three organisms.

16. If a colour blind woman marries a normal visioned man, their sons will be
(a) one-half colour blind and one-half normal
(b) three-fourths colour blind and one-fourth normal
(c) all colour blind
(d) all normal visioned

17. How many different kinds of gametes will be produced by a plant having the genotype AABbCC?
(a) Four (b) Nine (c) Two (d) Three

18. Triplet UUU codes for
(a) leucine (b) methionine (c) phenylalanine (d) glycine

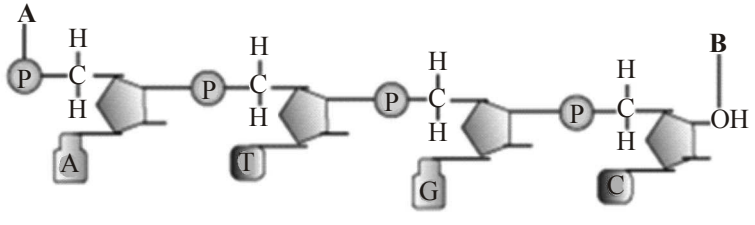
19. Operon is
(a) sequence of three nitrogen bases determining a single amino acid.
(b) a set of closely placed genes regulating a metabolic pathway in prokaryotes.
(c) segment of DNA specifying a polypeptide.
(d) gene responsible for switching on and switching off of other genes.

20. A sequential expression of a set of human genes occur when steroid molecule binds to the
(a) messenger RNA (b) DNA sequence (c) ribosome (d) transfer RNA

21. Transcriptional regulation in prokaryotes can occur by
(a) a repressor binding an operator and preventing transcription.
(b) an activator binding upstream from a promoter and positively affecting transcription.
(c) different promoter sequences binding RNA polymerase more tightly, resulting in more effective transcriptional initiation.
(d) All of the above

22. Satellite DNA
(a) is classified in many categories such as micro-satellites, minisatellites, etc. on the basis of base composition length of segments and number of repetitive units.
(b) normally does not code for any protein.
(c) shows polymorphism.
(d) forms the basis of DNA finger printing.

23. Through which among the following linkages are the two nucleotides connected through the 3'-5' end?



(a) Phosphodiether linkage (b) Phosphodisulphide linkage
(c) Phosphodinitrate linkage (d) Phosphodiester linkage

24. Which of the following statements about the process of DNA replication is false?
(a) Many different enzymes are needed for the process to function properly.
(b) Mistakes can be corrected at multiple steps in the process.
(c) Uncorrected mistakes introduce mutations into the DNA base sequence.
(d) Mistakes in the copying process are very common occurrences.

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:** The ovaries are located one on each side of the lower abdomen and each ovary is about 2-4 cm in length and is connected to the pelvic wall and uterus by ligaments.
Reason: Each ovary is covered by a thick epithelium which encloses the ovarian stroma and the stroma is divided into two zones viz peripheral medulla and an inner cortex.

26. **Assertion:** The female reproductive system consist of a pair of ovaries along with a pair of oviducts, uterus, cervix, vagina and the external genitalia located in pelvic.
Reason: The female reproductive parts along with a pair of the mammary glands are integrated structurally and functionally to support the processes of ovulation, fertilisation, pregnancy, birth and child care.

27. **Assetion:** Implantation occurs on 7th day after the fertilisation.
Reason: Fertilisation guarantees the establishment of pregnancy.

28. **Assertion:** The flower colour of sweet pea shows the inheritance of complementary genes.
Reason: The ratio obtained for complementary genes is 9:7.

29. The genotypic ratio of a monohybrid cross is

Cross of homozygous plants

Parent 1 TT × Parent 2 t t

	t	t
T	T t	T t
T	T t	T t

All F1 plants are heterozygous and they all have a tall stem.

(a) 1:2:1 (b) 3:1 (c) 2:1:1 (d) 9:3:3:1

30. Which one of the following is not a male accessory gland?
(a) Seminal vesicle (b) Ampulla
(c) Prostate (d) Bulbourethral gland

31. Milky water of green coconut is
(a) liquid chalaza (b) liquid nucellus
(c) liquid endosperm (d) liquid female gametophyte

32. Mature mammalian sperm are stored in the ____ prior to their release during ejaculation.
(a) seminiferous tubules (b) scrotum
(c) vas deferens (d) epididymis

33. Choose the right one amongst the statements given below.
(a) IUDs are generally inserted by the user herself.
(b) IUDs increase phagocytosis reaction in the uterus.
(c) IUDs suppress gametogenesis.
(d) IUDs once inserted need not be replaced.

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

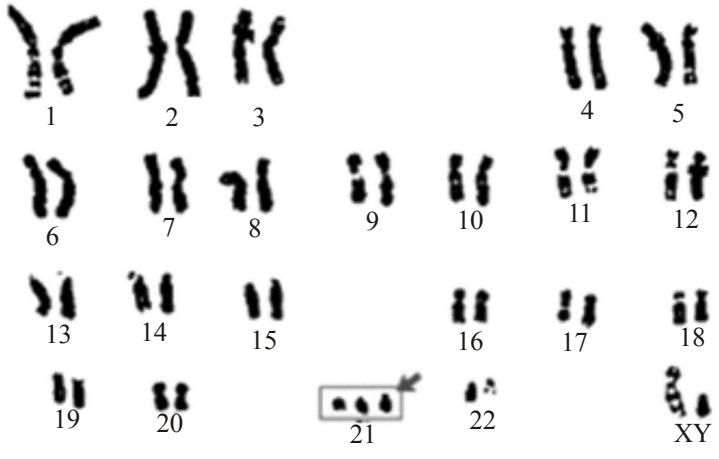
35. In angiosperms, the fusion of male gamete with the secondary nucleus is considered as "Second fertilisation" because
(a) it is a fusion of two nuclei
(b) secondary nucleus is a sister nucleus ofthe egg
(c) it takes place in embryo sac
(d) it takes place after pollination.

36. The syndrome in which individual somatic cell contains three sex chromosomes XXX is called
(a) Klinefelter's syndrome (b) Turner syndrome
(c) Down's syndrome (d) Super female

37. A gene showing codominance has:
(a) alleles tightly linked on the same chromosome
(b) alleles that are recessive to each other
(c) both alleles independently expressed in the heterozygote
(d) one allele dominant on the other

38. Which Mendelian idea is depicted by a cross in which the F1 generation resembles both the parents?
(a) Law of dominance
(b) Inheritance of one gene
(c) Co-dominance
(d) Incomplete dominance

39. There are several variations of Down syndrome with Trisomy 21 accounting for close to 95% of all cases recorded. There is another form of the syndrome that occurs when a segment of the 21st chromosome detaches to attach itself to another chromosome. Its name is



(a) Displacement (b) Duplication (c) Translocation (d) Chromosomal Mutation

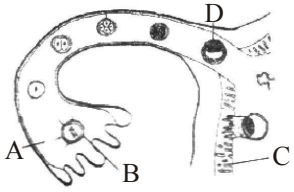
40. Inheritances of skin colour in humans is an example of
(a) point mutation (b) polygenic inheritance
(c) codominance (d) chromosomal aberration

41. A red-flowered plant crossed with a white-flowered plant of the same species, produced F_1 plants which all had pink flowers. Self-pollination of the F_1 plants produced and F_2 generation in which 39 plants had red flowers, 83 had pink flowers and 40 had white flowers. What does this experiment demonstrate?
(a) Codominance (b) Continuous variation (c) A dihybrid cross (d) Linkage

42. A human female with Turner's syndrome:
(a) has 45 chromosomes with XO. (b) has one additional X chromosome.
(c) exhibits male characters. (d) is able to produce children with normal husband.

43. An immature male gametophyte differs from a mature male gametophyte in that it
(a) has not yet left the pollen sac
(b) has not yet germinated and its generative cell has not divided into two male gametes
(c) is a microspore that has not yet divided by mitosis
(d) still consists ofmicrosporocyte.

44. What do A, B. C and D represent?



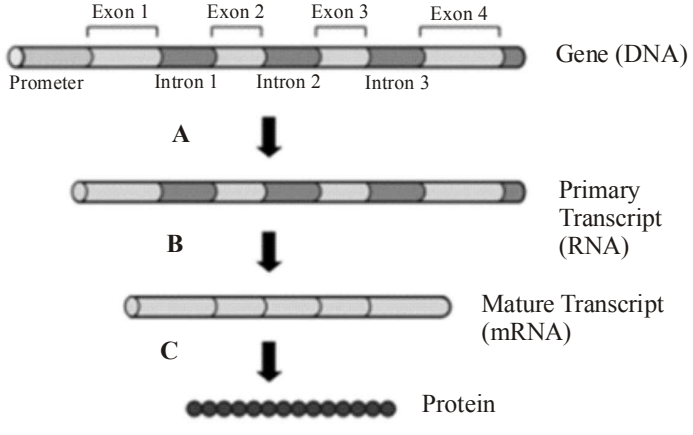
	A	B	C	D
(a)	Infundibulum	Fertilisation	Myometrium	Morula
(b)	Infundibulum	Fertilisation	Endometrium	Blastocyst
(c)	Isthmus	Fertilisation	Myometrium	Blastocyst
(d)	Isthmus	Fertilisation	Endometrium	Morula

45. Test cross involves
(a) crossing between two F1 hybrids
(b) crossing the F_1 hybrid with a double recessive genotype
(c) crossing between two genotypes with dominant trait
(d) crossing between two genotypes with recessive trait

46. Sickle cell anaemia is:
(a) caused by substitution of valine by glutamic acid in the beta globin chain of haemoglobin
(b) caused by a change in a single base pair of DNA
(c) characterized by elongated sickle like RBCs with a nucleus
(d) an autosomal linked dominant trait

47. Which of these pairs is mismatched?
(a) Cleavage – Cell division
(b) Blastula – Gut formation
(c) Gastrula – Three germ layers
(d) Neurula – Nervous system

48. The splice site is found in _____

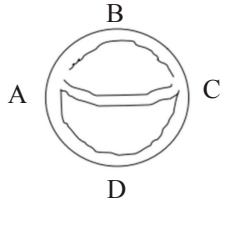


(a) 3' end of exon (b) 5' end of intron (c) Within the exon (d) Within the introns

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.*

DNA replication is studied in a newly discovered bacterium. It takes 30 min for the bacterium to complete a round of replication at 37°C. Autoradiography of the replicating DNA molecule shows the following structure.



A Meselson-Stahl-type experiment was also performed. The bacteria were grown for several generations in ^{14}N-medium and then switched to ^{15}N-medium. The DNA molecules were then analyzed.

49. Which is a characteristic of Meselson-Stahl experiments?
(a) DNA molecules are separated based on size.
(b) DNA molecules reach an equilibrium position in the centrifuge tube.
(c) DNA molecule distinguish in CsCl by centrifugation.
(d) CsCl becomes separated into different bands when centrifuged.

50. If the mechanism of DNA replication in this bacterium were dispersive, what results would be found when the double-stranded DNA was analyzed in a CsCl gradient after two generations in ^{15}N-medium?
(a) One band would be observed containing all the DNA.
(b) Two bands would be observed containing equal amounts of DNA.
(c) Two bands would be observed containing unequal amounts of DNA.
(d) The DNA cannot form any bands if replication is dispersive.

51. If the mechanism of DNA replication in this bacterium were semi-conservative, what results would be found when the double-stranded DNA was analyzed in a CsCl density gradient after three generations in ^{15}N-medium?
(a) The DNA would form three bands: one with hybrid density, one with light density, and one with heavy density.
(b) The DNA would form one band with hybrid density.
(c) The DNA would form two bands: one with heavy density and one with hybrid density.
(d) The DNA would form two bands: one with light density and one with hybrid density.

52. If this bacterium is similar to E. coli in its mechanism of DNA replication, then which will occur when the bacterium is grown at 37°C?
(a) There will be two replication forks when replication occurs in poor medium.
(b) There will be four replication forks when replication occurs in rich medium.
(c) The rate of polymerization will vary depending upon the medium.
(d) The frequency of initiation will be constant regardless of the medium

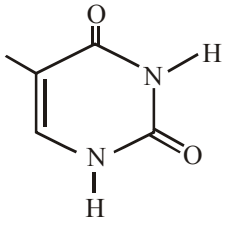
53. If this bacterium is similar to E. coli in its mechanism of DNA replication, then which will occur when the bacterium is grown at 37°C?
(a) At least one round of replication will be occurring at all times.
(b) Only one round of replication can take place at a given time.
(c) The newly synthesized DNA strands will bond together in a double-helix.
(d) All rounds of replication start at a specific sequence on the chromosome.

54. Which conclusion can be made about DNA replication in this bacterium based only on the autoradiography structure?
(a) Replication in this bacterium could occur bidirectionally from an origin at point A.
(b) Replication in this bacterium could occur unidirectionally from an origin at point D.
(c) Replication in this bacterium could terminate at point B.
(d) Replication in this bacterium could terminate at point C.

55. What will the polarity of this strand be?

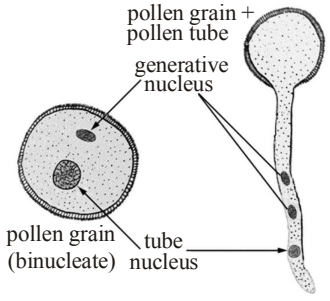
(a) Parallel, 3' → 5'
(b) Antiparallel, 3' → 5'
(c) Parallel, 5' → 3'
(d) Antiparallel, 5' → 3'

56. What is name of this nitrogenous base?



(a) Uracil
(b) Thymine
(c) Cytosine
(d) Guanine

57. Generative nucleus divides forming

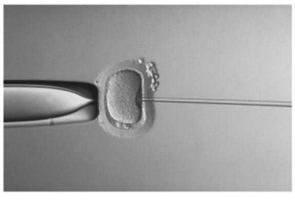


(a) 2 male nuclei (b) 3 male nuclei (c) 2 female nuclei (d) 3 female nuclei

58. An example of false fruit is

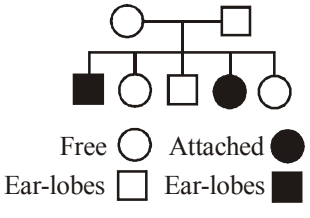
(a) apple (b) banana (c) cherry (d) None of these

59. Which Artificial Reproductive Technique can help a lady conceive a child if both her fallopian tubes are blocked?



(a) SUZI (b) IVF (c) ZIFT (d0 GIFT

60. Given below is a pedigree chart of a family with five children. It shows the inheritance of attached earlobes as opposed to the free ones. Which one of the following conclusions drawn is correct?



(a) The parents are homozygous recessive
(b) The trait is Y-linked
(c) The parents are homozygous dominant
(d) The parents are heterozygous

OMR ANSWER SHEET

Sample Paper No – 1

- ✶ Use Blue / Black Ball pen only.
- ✶ Please do not make any atray marks on the answer sheet.
- ✶ Rough work must not be done on the answer sheet.
- ✶ Darken one circle deeply for each question in the OMR Answer sheet, as faintly darkend / half darkened circle might by rejected.

Start time : _____ End time _____ Time taken _____

1. Name (in Block Letters)

2. Date of Exam

3. Candidate's Signature

SECTION-A

1.	a	b	c	d	9.	a	b	c	d	17.	a	b	c	d
2.	a	b	c	d	10.	a	b	c	d	18.	a	b	c	d
3.	a	b	c	d	11.	a	b	c	d	19.	a	b	c	d
4.	a	b	c	d	12.	a	b	c	d	20.	a	b	c	d
5.	a	b	c	d	13.	a	b	c	d	21.	a	b	c	d
6.	a	b	c	d	14.	a	b	c	d	22.	a	b	c	d
7.	a	b	c	d	15.	a	b	c	d	23.	a	b	c	d
8.	a	b	c	d	16.	a	b	c	d	24.	a	b	c	d

SECTION-B

25.	a	b	c	d	33.	a	b	c	d	41.	a	b	c	d
26.	a	b	c	d	34.	a	b	c	d	42.	a	b	c	d
27.	a	b	c	d	35.	a	b	c	d	43.	a	b	c	d
28.	a	b	c	d	36.	a	b	c	d	44.	a	b	c	d
29.	a	b	c	d	37.	a	b	c	d	45.	a	b	c	d
30.	a	b	c	d	38.	a	b	c	d	46.	a	b	c	d
31.	a	b	c	d	39.	a	b	c	d	47.	a	b	c	d
32.	a	b	c	d	40.	a	b	c	d	48.	a	b	c	d

SECTION-C

49.	a	b	c	d	53.	a	b	c	d	57.	a	b	c	d
50.	a	b	c	d	54.	a	b	c	d	58.	a	b	c	d
51.	a	b	c	d	55.	a	b	c	d	59.	a	b	c	d
52.	a	b	c	d	56.	a	b	c	d	60.	a	b	c	d

No. of Qns. Attempted		Correct		Incorrect		Marks	