SAMPLE PAPER

Time Allowed: 90 *Minutes* *Maximum Marks*: 35

General Instructions: Same as Sample Paper-1

Section-A

Section–A consists of 24 questions. Attempt any 20 questions from this section. The first attempted 20 questions would be evaluated.

1. A dicotyledonous plant bears flowers but never produces fruits and seeds. The most probable cause for the above situation is:
   (*a*) Plant is dioecious and bears only pistillate flowers
   (*b*) Plant is dioecious and bears both pistillate and staminate flowers
   (*c*) Plant is monoecious
   (*d*) Plant is dioecious and bears only staminate flowers.
2. Which of the following represent megagametophyte?
   (*a*) Ovule (*b*) Embryo sac (*c*) Nucellus (*d*) Endosperm
3. The scar left by funiculus in the seed is
   (*a*) tegmen (*b*) radicle (*c*) epicotyl (*d*) hilum
4. A Plant called X possesses small flower with reduced perianth and versatile anther. The probable agent for pollination would be
   (*a*) water (*b*) air (*c*) butterflies (*d*) beetles
5. Parthenocarpic fruits lack
   (*a*) Endocarp (*b*) Epicarp (*c*) Mesocarp (*d*) seed
6. In majority of plants pollen is liberated at
   (*a*) 1 celled stage (*b*) 2 celled stage (*c*) 3 celled stage (*d*) 4 celled stage
7. During oogenesis, each diploid cell produces
   (*a*) four functional eggs (*b*) two functional eggs and two polar bodies
   (*c*) one functional egg and three polar bodies
   (*d*) four functional polar bodies.
8. Layers of an ovum from outside to inside is
   (*a*) corona radiata, zona pellucida and vitelline membrane
   (*b*) zona pellucida, corona radiata and vitelline membrane
   (*c*) vitelline membrane, zona pellucida and corona radiata
   (*d*) zona pellucida, vitelline membrane and corona radiata.
9. Which part of ovary in mammals acts as an endocrine gland after ovulation ?.
   (*a*) Stroma (*b*) Germinal epithelium
   (*c*) Vitelline membrane (*d*) Graafian follicle
10. What is true about cleavage in the fertilized egg in humans ?
    (*a*) It starts while the egg is in Fallopian tube.

(*b*) It starts when the egg reaches uterus.

(*c*) It is meroblastic (*d*) It is identical to the normal mitosis.

11. The solid mass of 8-16 cells formed from zygote after successive mitotic divisions is called

(*a*) blastula (*b*) gastrula (*c*) morula (*d*) none of these.

12. Implantation takes place after _____ of fertilization.

(*a*) 5 days (*b*) 6 days (*c*) 7 days (*d*) 8 days

13. Structure connecting the foetus to placenta is

(*a*) umbilical cord (*b*) amnion (*c*) yolk sac (*d*) chorion.

14. A marriage between a colourblind man and a normal woman produces

(*a*) All carrier daughters and normal sons

(*b*) 50% carrier daughters, 50% normal daughters

(*c*) 50% colourblind sons, 50% normal sons

(*d*) All carrier offsprings

15. Klinefelters' syndrome is characterized by a karyotype of

(*a*) XYY (*b*) XO (*c*) XXX (*d*) XXY

16. Females with Turners' syndrome have

(*a*) Small uterus (*b*) Rudimentary ovaries

(*c*) Underdeveloped breasts (*d*) All of these

17. Select the disease which is caused by recessive autosomal genes when present in homozygous conditions

(*a*) Alkaptonuria (*b*) Albinism (*c*) Cystic fibrosis (*d*) All of these

18. In *E. coli*, the *lac* operon gets switched on when

(*a*) lactose is present and it binds to the repressor

(*b*) repressor binds to operator

(*c*) RNA polymerase binds to the operator

(*d*) lactose is present and it binds to RNA polymerase.

19. If a double stranded DNA has 20% of cytosine, what will be the percentage of adenine in it?

(*a*) 20% (*b*) 40% (*c*) 30% (*d*) 60%

20. The structure in chromatin seen as 'beads-on string' when viewed under electron microscope are called

(*a*) nucleotides (*b*) nucleosides (*c*) histone octamer (*d*) nucleosomes

21. The year 1953 is known for the discovery of

(*a*) transposons by Barbare Mc Clintock (*b*) structure of DNA by Watson and Crick

(*c*) Mendel's laws of inheritance (*d*) biotechnology by Kary Muliis

22. The process of transformation is not affected by which of the following enzymes ?

A. DNase B. RNase C. Peptidase D. Lipase

(*a*) A, B (*b*) A, B, C, D (*c*) B, C, D (*d*) A, B, C

23. Amino acids which are specified by single codons are

(*a*) phenylalanine and arginine (*b*) tryptophan and methionine

(*c*) valine and proline (*d*) methionine and aroinine.

24. The mutations that involve addition, deletion or substitution of a single pair in a gene are referred to as

(*a*) point mutations (*b*) frameshift mutations

(*c*) silent mutations (*d*) none of these

Section-B

Section–B 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*) Both A and R are true and R is the correct explanation of A

(*b*) Both A and R are true and R is not the correct explanation of A

(*c*) A is true but R is false

(*d*) A is False but R is true

25. **Assertion (A):** Fusion of male and female gametes results in zygote.

Reason (R): Product of triple fusion is PEN.

26. **Assertion (A):** Human pregnancy lasts for 40 weeks.

Reason (R): During gestation, embryo's heat develops during 12th week.

27. **Assertion (A):** In *Mirabilis*, selfing of F_1 pink flower plants produces same phenotypic and genotypic ratio.

Reason (R): Flower colour gene shows incomplete dominance.

28. **Assertion (A):** In a DNA molecule, A–T rich parts melt before G–C rich parts.

Reason (R): In between A and T there are three H–bond, whereas in between G and C there are two H–bonds.

29. Sterilisation techniques are generally fool proof methods of contraception with least side effects. Yet, this is the last option for the couples because:

(*i*) It is almost irreversible

(*ii*) Of the misconception that it will reduce sexual urge/drive

(*iii*) It is a surgical procedure

(*iv*) Of lack of sufficient facilities in many parts of the country

Choose the correct option:

(*a*) (*i*) and (*iii*) (*b*) (*ii*) and (*iii*)

(*c*) (*ii*) and (*iv*) (*d*) (*i*), (*ii*), (*iii*) and (*iv*)

30. Select the proper hormonal composition of oral contraceptive pills

(*a*) FSH and Prolactin (*b*) Prolactin and TSH

(*c*) TSH and FSH (*d*) FSH and LH

31. Identify the mismatched pair.

STD's	**Causative organisms**
(*a*) Syphilis	(*i*) *Treponema palladium*
(*b*) Lymphogranuloma venereum	(*ii*) *Chlamydia trachomatis*
(*c*) Candidiasis	(*iii*) Albugo candida
(*d*) Genital warts	(*iv*) Human Papilloma virus

32. Identify the correct statement.

(a) Lactational amenorrhea is a permanent birth control method

(b) Condoms are made of polyethylene glycol and lambskin

(c) LNG -20 is a copper - releasing IUD

(d) Diaphragm covers the cervix thereby preventing sperm entry

33. Polygonum type of embryo sac is

(a) 8 – nucleate, 7 – celled (b) 8 – nucleate, 8 – celled

(c) 7 – nucleate, 7 – celled (d) 4 – nucleate, 3 – celled

34. Male and female flowers are present on different plants (dioecious) to ensure xenogamy, in

(a) papaya (b) bottle gourd (c) maize (d) all of these

35. Which of the following is not a water pollinated plant ?

(a) Zostera (b) Vallisneria (c) Hydrilla (d) Cannabis

36. A short narrow part that follows ampulla is

(a) Isthmus (b) Infundibulum (c) Cervix (d) Fimbria

37. Which of the following hormones is not a secretory product of human placenta ?

(a) Human chorionic gonadotropin (b) Prolactin

(c) Estrogen (d) Progesterone

38. During the development of embryo, which of the following occurs first?

(a) Differentiation of organ (b) Differentiation of tissue

(c) Differentiation of organ system (d) Differentiation of cells

39. Gastrula is the embryonic stage in which

(a) cleavage occurs (b) blastocoel form

(c) germinal layers form (d) villi form

40. The first movements of the foetus and appearance of hair on its head are usually observed during which month of pregnancy?

(a) Fourth month (b) Fifth month

(c) Sixth month (d) Third month

41. The family pedigree of Queen Victoria, who was a carrier of

(a) Colour blindness (b) Sickle cell anaemia

(c) Phenylketouria (d) Haemophilia

42. This abnormality occurs with 44 + XO genotype

(a) Edward's syndrome (b) Down's syndrome

(c) Turner's syndrome (d) Klinefelter's syndrome

43. All genes located on the same chromosome

(a) form different groups depending upon their relative distance

(b) form one linkage group

(c) will not form any linkage groups

(d) form interactive groups that affect the phenotype.

44. Which is NOT a part of transcription unit?

(*a*) Promoter (*b*) Operator (*c*) Structural gene (*d*) Terminator

45. Match the following:

A. Semi - conservative model	(*i*) Griffith
B. Transformation	(*ii*) R. Holley
C. Clover leaf model	(*iii*) Jacob and Monod
D. Lac operon model	(*iv*) Meselson and Stahl

(*a*) A-(*iv*), B-(*i*), C-(*ii*), D-(*iii*) (*b*) A-(*i*), B-(*ii*), C-(*iii*), D-(*iv*)

(*c*) A-(*ii*), B-(*iii*), C-(*i*), D-(*iv*) (*d*) A-(*iii*), B-(*ii*), C-(*iv*), D-(*i*)

46. Sickle cell anaemia results from a single base substitution in a gene, thus it is an example of

(*a*) point mutation (*b*) frame-shift mutation

(*c*) silent mutation (*d*) both (*a*) and (*b*)

47. Amino acid acceptor end of tRNA lies at

(*a*) 5′ end (*b*) 3′ end

(*c*) both 3′ and 5′ end (*d*) none of these

48. RNA is the genetic material in

(*a*) prokaryotes (*b*) eukaryotes

(*c*) Tabacco Mosaic Virus (TMV) (*d*) E.coli.

Section-C

Section–C 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.

Case Study

A tabular column representing various types of blood group in human beings, their phenotypes, genotypes, antigens and respective antibodies is given here:

Genetic basis of the human ABO blood groups:

Genotype	ABO blood group phenotype	Antigens present on red blood cell	Antibodies present in blood plasma
I^AI^A	Type A	A	Anti-B
I^AI^O	Type A	A	Anti-B
I^BI^B	Type B	B	Anti-A
I^BI^O	Type B	B	Anti-A
I^AI^B	Type AB	A and B	Neither Anti-A nor Anti-B
I^OI^O	Type O	Neither A nor B	Anti-A and anti-B

49. Identify the proper dominance hierarchy
(*a*) $I^A = I^O > I^B$ (*b*) $I^A = I^B > O$ (*c*) $I^O = I^B > I^A$ (*d*) $I^B = I^A > O$

50. Which blood group does not possess antibodies?
(*a*) I^AI^B (*b*) I^OI^O (*c*) I^{AO} (*d*) I^BI^B

51. I^A and I^B genes of ABO blood group are
(*a*) Co-dominant (*b*) Pleotropic
(*c*) Dominant and recessive (*d*) Epistatic

52. Antigens A and Antigen B was discovered by
(*a*) Karl Landsteiner (*b*) F. Galton (*c*) Turner (*d*) Klinefelter

53. The possible genotypes for a person having B-blood group is
(*a*) I^BI^B or I^BI^O (*b*) $I^A I^B$ or $I^A I^O$ (*c*) $I^A I^A$ or $I^B I^A$ (*d*) None of these

54. What is the phenotype of I^AI^O?
(*a*) A blood group person (*b*) O blood group person
(*c*) B blood group person (*d*) None of these

55. A couple has six daughters. What is the possibility of their having a girl next time?
(*a*) 10% (*b*) 50% (*c*) 90% (*d*) 100%

56. Haplodiploidy is found in
(*a*) grasshoppers and cockroaches (*b*) birds and reptiles
(*c*) butterflies and moths (*d*) honeybees, ants and wasp

57. Select the incorrect statement regarding pedigree analysis.
(*a*) Solid symbols show unaffected individuals.
(*b*) Proband is the person from which case history starts.
(*c*) It is useful for genetic counsellors.
(*d*) It is an analysis of traits in several generations of a family.

58. Histone proteins are
(*a*) basic, negatively charged (*b*) basic, positively charged
(*c*) acidic, positively charged (*d*) acidic, negatively charged

59. The wrong statement about heterochromatin is
(*a*) It is densely packed (*b*) It stains dark.
(*c*) It is transcriptionally active. (*d*) It is late replicating.

60. The three codons which result in the termination of polypeptide chain synthesis are
(*a*) UAA, UAG, GUA (*b*) UAA, UAG, UGA
(*c*) UAA, UGA, UUA (*d*) UGU,UAG,UGA

Answers

Sample Paper

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