

Sample Paper

3

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

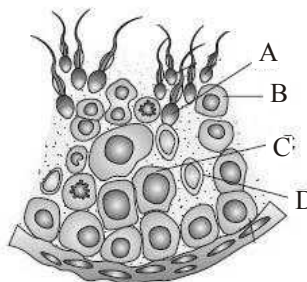
SECTION-A

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

1. In human embryology, the chorion is derived from
(a) Ectoderm (b) Mesoderm & Ectoderm (c) Endoderm (d) Trophoblast
2. After the transformation of spermatids into sperm, their heads become embedded in a cell called "X" and are finally released from the "Y" by the process called "Z". Identify X, Y and Z.

| | X | Y | Z |
|-----|----------------|---------------------|----------------|
| (a) | Spermatogonium | Epididymis | Insemination |
| (b) | Leydig | Vas deferens | Parturition |
| (c) | Sertoli | Seminiferous tubule | Spermiation |
| (d) | Spermatocyte | Seminiferous tubule | Spermiogenesis |

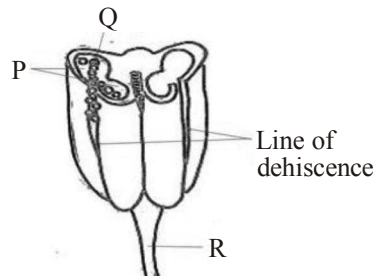
3. What will happen to pregnancy if placenta fails to function during the gestation?
(a) The pregnancy would not continue.
(b) The foetus would be born prematurely.
(c) There would be no effect on the pregnancy.
(d) The corpus luteum would continue produce hormone as an alternative source until birth.
4. Primitive streak in human embryo
(a) is formed before gastrulation (b) is formed during gastrulation
(c) is formed after gastrulation is complete (d) is not formed in mammals, but in birds and reptiles
5. The figure given below shows the sectional view of seminiferous tubule.



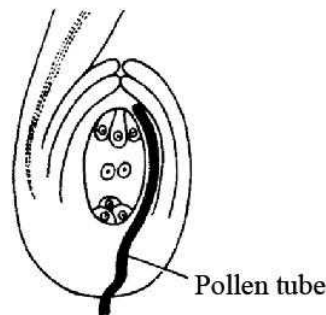
Which marked structure (A to D) undergoes second meiotic division to produce four equal haploid cells (called spermatids)?

- (a) A (b) B (c) C (d) D

6. Which of the following statement(s) is/are **incorrect** ?
- Endosperm formation starts prior to first division of zygote.
 - Angiospermic endosperm is mostly $3N$ while gymnospermic one is N .
 - The most common type of endosperm is nuclear.
 - Coconut has both liquid nuclear (multinucleate) and cellular endosperm.
 - Milky water of green tender coconut is liquid female gametophyte.
- (a) (i) and (ii) (b) Only (iii) (c) Only (v) (d) Only (ii)
7. Refer to the given figure. Identify the labelled parts and select the incorrect statement regarding them.

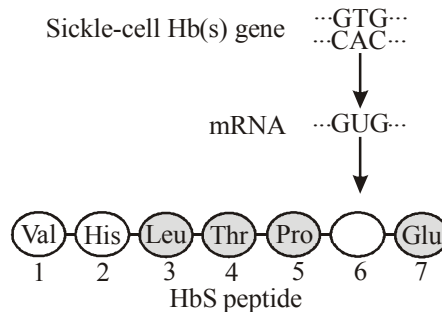


- P extend longitudinally throughout the length of an anther and are packed with Q.
 - R is long and slender stalk, attached proximally to thalamus or petal.
 - The study of Q is called palynology.
 - None of these
8. Which of the following processes is necessary for the complete development of male gametophyte?
- One meiotic cell division and two mitotic cell divisions.
 - One meiotic cell division and one mitotic cell division.
 - Two meiotic cell divisions and one mitotic cell division.
 - Two mitotic cell divisions.
9. In a seed of maize, scutellum is considered as cotyledon because it
- protects the embryo.
 - contains food for the embryo.
 - absorbs food materials and supplies them to the embryo.
 - converts itself into a monocot leaf.
10. The given diagram represent

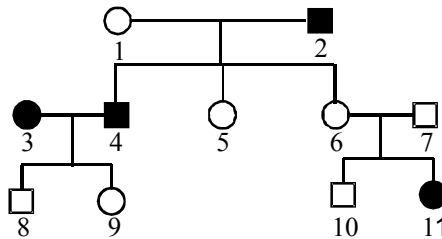


- Mesogamy (b) Porogamy (c) Chalazogamy (d) None of them
11. Filiform apparatus is found in
- synergids (b) anther wall (c) secondary nucleus (d) egg cell
12. Turner syndrome is due to
- Loss of X chromosome – $44 + XO$ (b) Loss of any chromosome
 - It is due to trisomy in 21st pair (d) None
13. Which of the following statement confirm the law of dominance
- 3:1 ratio in F_2 generation
 - It is the conclusion of a dihybrid cross
 - Alleles do not show any blending and both characters recovered as such in F_2 generation
 - Alleles of a pair segregate from each other such that gamete receives only one of the two factors

14. Which of the following is true for given diagram.

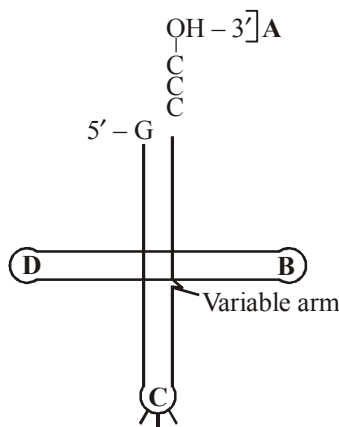


- (a) A → Autosomal dominant (b) B → Glutamic acid
(c) B → Valine (d) It is caused due to bacteria
15. Mother and father of a person with 'O' blood group have 'A' and 'B' blood group respectively. What would be the genotype of both mother and father.
- (a) Mother is homozygous for 'A' blood group and father is heterozygous for 'B'
(b) Mother is heterozygous for 'A' blood group and father is heterozygous for 'B'
(c) Both mother and father are heterozygous for 'A' and 'B' blood group respectively
(d) Both mother and father are homozygous for 'A' and 'B' blood group respectively.
16. Originally, genetic inheritance was thought to be a function of the blending of traits from the two parents. Which exception to Mendel's rules is an example of blending ?
- (a) Polygenic inheritance (b) Incomplete dominance
(c) Codominance (d) Pleiotropism
17. In Huntington's disease, the unaffected persons are homozygous for normal allele, h. The following is erroneous because:



- (a) it shows both male and female affected by Huntington's disease.
(b) either person 6 or 7 should have the disease, if individual 11 shows the disease.
(c) at least one of the 2 children (8, 9) should have the disease.
(d) All of the above
18. Haemophilia is mentioned as a trait carried by the mother and passed to her sons. What is the pattern of inheritance for this trait ?
- (a) Haemophilia is an allele carried on one of the mother's autosomal chromosomes.
(b) Haemophilia is an allele carried on the Y-chromosome because more males have this genetic disorder than females.
(c) Haemophilia is an allele carried on the X-chromosome and can be directly inherited by the son from the father or the mother.
(d) Haemophilia is carried on the X-chromosome and can only be inherited by the son if the mother is a carrier.
19. The okazaki fragments in DNA chain
- (a) result in transcription.
(b) polymerize in the 3' to 5' direction and forms replication form.
(c) prove semi-conservative nature of DNA replication.
(d) polymerize in the 5' to 3' direction and explain 3' to 5' DNA replication.
20. Methyl guanosine triphosphate is added at 5' end of hn-RNA in a process of
- (a) tailing (b) splicing (c) capping (d) None of these
21. 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.

22. Identify the labels A, B, C and D in the given structure of tRNA and select the correct option.



| | A | B | C | D |
|-----|-----------------|-----------------------|-----------------------|-----------------------|
| (a) | Anticodon | T _Ψ C loop | AA binding site | DHU loop |
| (b) | AA binding site | T _Ψ C loop | Anticodon loop | DHU loop |
| (c) | AA binding site | DHU loop | Anticodon loop | T _Ψ C loop |
| (d) | AA binding site | DHU loop | T _Ψ C loop | Anticodon loop |

23. Select the two correct statements out of the four (i–iv) given below about *lac* operon.
- Glucose or galactose may bind with the repressor and inactivate it.
 - In the absence of lactose, the repressor binds with the operator region.
 - The z-gene codes for permease.
 - This was elucidated by Francois Jacob and Jacque Monod.
- (a) (ii) and (iii) (b) (i) and (iii) (c) (ii) and (iv) (d) (i) and (ii)
24. During elongation of polypeptide chain, sigma factor is
- functionless.
 - retained for specific function.
 - released for re-use.
 - required during closing of chain.

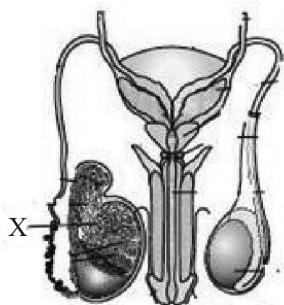
SECTION-B

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.

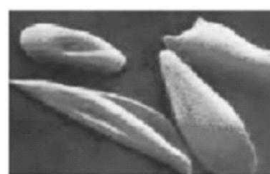
Question No. 25 to 28: Consist of two statements Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

- If both Assertion and Reason are True and the Reason is a correct explanation of the Assertion.
 - If both Assertion and Reason are True but Reason is not a correct explanation of the Assertion.
 - If the Assertion is True but Reason is False.
 - If both Assertion and Reason are False.
25. **Assertion :** The technique of DNA fingerprinting was initially developed by Alec jeffreys.
Reason : The DNA fingerprinting technique involved southern blot hybridisation using radiolabelled VNTR as probe.
26. **Assertion :** The Human Genome Project was a 13-year project coordinated by the U.S. Department of Energy and the National Institute of Health.
Reason : During the early years of the HGP, the Welcome Trust (U.K.) became a major partner; additional contribution came from Japan, France, Gemany, China and others.
27. **Assertion:** HIV can also be transmitted by sharing of injection needles, surgical instruments etc. with infected persons, transfusion of blood or form an infected mother to the foetus too.
Reason: Hepatitis B, genital herpes and HIV infections are caused by bacterial infection.
28. **Assertion:** Condom should be used regularly and put on before starting coital activity, otherwise sperm containing lubricating fluid may be left in the vagina.
Reason: Condom should be reused again after two hours.

29. Identify the structure marked as "X" and its function in the given figure of male reproductive system.

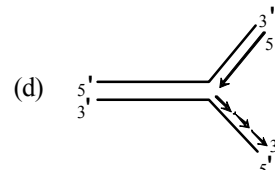
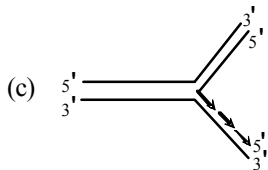
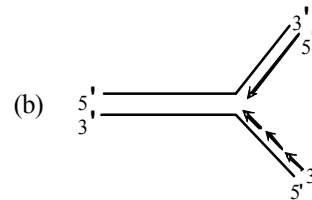
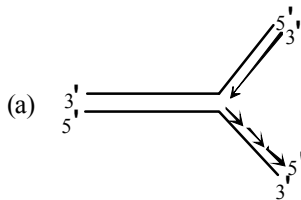


- (a) Rete testis: It helps seminiferous tubule to open into vas efferentia.
 (b) Bulbourethral gland: It secretes alkaline mucus for lubricating the reproductive tract.
 (c) Vas efferentia: They have contractile mechanism that aids in the emission of seminal fluid.
 (d) Seminal vesicle: It synthesizes and secretes testicular hormone.
30. Read the following statement and answer the question.
 "The urethra originates from a structure (called 'X') and extends through the male external genitalia (called 'Y' which helps in introducing semen into the vagina) to its external opening called urethral meatus."
 Identify X and Y.
- (a) X - Urinary bladder ; Y - Penis
 (b) X - Vas efferentia ; Y - Penis
 (c) X - Ejaculatory duct ; Y - Ureter
 (d) X - Bulbourethral gland ; Y - Ureter
31. The angiospermic endosperm, except in special cases, is a triploid (3n) tissue as it is product of triple fusion involving double fertilisation. It is, thus distinct from the endosperm of gymnosperms and heterosporous pteridophytes, where the endosperm is a
- (a) diploid before fertilisation
 (b) simple haploid (n) tissue of the gametophyte not involving any complication like polar fusion or fertilisation
 (c) polyploid formed after simple fertilisation
 (d) haploid formed after fertilisation
32. Select the correct statements regarding oogenesis.
- (i) It is initiated during the embryonic development stage when millions of oogonia are formed within each ovary.
 (ii) Graafian follicle releases primary oocyte from the ovary by ovulation.
 (iii) At puberty only 60,000 – 80,000 primary follicles are left in each ovary.
 (iv) Secondary oocyte within tertiary follicles grows in size and completes its second meiotic division.
- (a) (i), (ii) and (iii) (b) (i) and (iii) (c) (ii) and (iv) (d) all the four statements.
33. Which of the following STDs are not completely curable?
- (a) Chlamydia, gonorrhoea, trichomoniasis (b) Chancroid, syphilis, genital warts
 (c) AIDS, syphilis, hepatitis B (d) AIDS, genital herpes, hepatitis B
34. The first case of IVF-ET technique success, was reported by:
- (a) Bayliss and Starling Taylor (b) Robert Steptoe and Gilbert Brown
 (c) Louis Joy Brown and Banting Best (d) Patrick Steptoe and Robert Edwards
35. Which of the following method can be used for women who cannot produce ovum but can provide suitable environment?
- (a) IUD (b) GIFT (c) IUI (d) ICSI
36. The crossing of F₁ to homozygous recessive parent is called
- (a) back cross (b) test cross (c) F₁ cross (d) all of these
37. In fruit fly the maleness is determined by
- (a) Chromosomal ploidy (b) Ratio of X chromosome to Y chromosome
 (c) Presence of Y chromosome (d) None of these
38. Human blood grouping is ABO instead of ABC because O in it refers to
- (a) no antigen A or B on RBCs. (b) other antigens besides A and B.
 (c) overdominance of its gene over A and B. (d) one antibody only either anti-A or anti-B.
39. Which of the following diagram shows the sickle-cell anaemia condition?

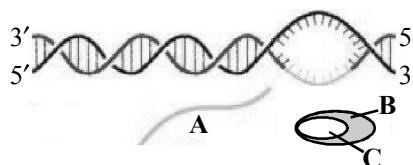


- (a) Fig (A) (b) Fig (B) (c) Both Fig (A) & (B) (d) None of them

40. Round seed trait (R) is dominant over wrinkled (r) seed trait in Pea. Heterozygous round seeded plant (Rr) is crossed with wrinkled seeded plant (rr). What is the possibly progeny?
 (a) 302 round : 102 wrinkled (b) 210 round : 95 wrinkled
 (c) 105 round : 99 wrinkled (d) 103 round : 315 wrinkled
41. What will be the first three children. If the parents are heterozygous albino, the first three children will be
 (a) some normal, heterozygous and albino (b) normal
 (c) heterozygous albino (d) None of these
42. Identify the **incorrect** statement about RNA.
 (a) RNA was the first genetic material to evolve in the living systems.
 (b) Apart from being a genetic material, it is also a catalyst.
 (c) DNA evolved from RNA with chemical modifications.
 (d) RNA being a catalyst is non-reactive and stable.
43. In some viruses, RNA is present instead of DNA indicating that
 (a) their nucleic acid must combine with host DNA before replication.
 (b) they cannot replicate.
 (c) there is no hereditary information.
 (d) RNA can act to transfer heredity.
44. Which one of the following correctly represents the manner of replication of DNA?



45. 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.
46. Which of the following is **Not** a goal of the human genome project?
 (a) To sequence the genomes of selected model organisms.
 (b) To eliminate all diseases.
 (c) To consider social, ethical and legal aspects of genetic information.
 (d) To develop computational tools for analyzing sequence information.
47. Polymorphism in DNA sequence
 (a) is the basis of genetic mapping of human genome.
 (b) arises due to mutation.
 (c) is the basis of DNA finger printing.
 (d) All of the above
48. The given figure represent one of the step in the process of transcription in bacteria. Identify the step and label A, B & C marked in the figure.

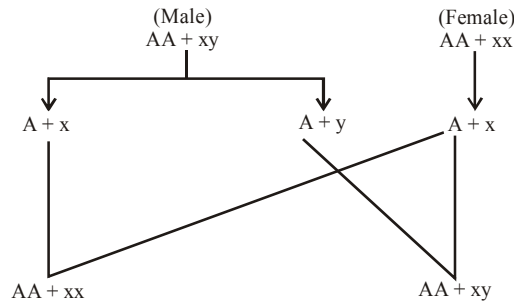


- (a) Initiation; A – DNA, B – RNA, C – Promoter
 (b) Termination; A – RNA, B – RNA polymerase, C – Rho factor
 (c) Elongation; A – RNA, B – RNA polymerase, C – Sigma factor
 (d) Elongation; A – DNA, B – DNA polymerase, C – RNA

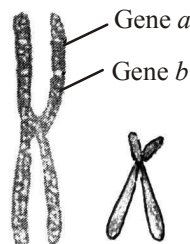
SECTION-C

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.

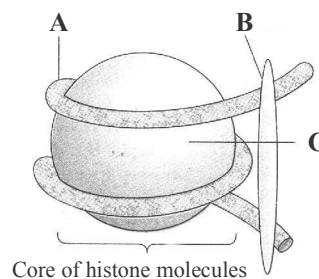
Observe the following schematic representation of determination of sex (xx-xy type mechanism) and answer the question that follows-



49. In an entity with genetic composition AA + xxy such as *Drosophila* will be a normal female. In the case of mammals, it will be?
 (a) Turner (b) Klinefelter (c) Normal female (d) Normal male
50. _____ discovered by xy sex chromosome.
 (a) MJD White (b) R Brown (c) Nettie Stevens (d) Mendel
51. The number of Barr bodies are found in a female with xxxy chromosomes
 (a) four (b) three (c) two (d) one
52. If a boy has sexual characters of that of a girl, its genotype would be
 (a) xxy (b) xyy (c) xo (d) xxy
53. The chromosomes accounted for sex determination are referred to as
 (a) Heterosis (b) Multiple alleles (c) Allosomes (d) Autosome
54. Which one of the following conditions correctly describes the manner of determining the sex in the given example?
 (a) Homozygous sex chromosomes (ZZ) determine female sex in birds.
 (b) XO type of sex chromosomes determine male sex in grasshopper.
 (c) XO condition in human as found in Turner's syndrome, determines female sex.
 (d) Homozygous sex chromosomes (XX) produce male in *Drosophila*.
55. The given figure is a highly simplified representation of the human sex chromosomes from a karyotype. The gene *a* and *b* could be of



- (a) colour blindness and body height. (b) attached ear lobe and Rhesus blood group.
 (c) haemophilia and red-green colour blindness. (d) phenylketonuria and haemophilia.
56. The given figure shows the structure of nucleosome with their parts labelled as A, B & C. Identify A, B and C.



- (a) A – DNA; B – H₁ histone; C – Histone octamer (b) A – H₁ histone; B – DNA; C – Histone octamer
 (c) A – Histone octamer; B – RNA; C – H₁ histone (d) A – RNA; B – H₁ histone; C – Histone octamer

OMR ANSWER SHEET

Sample Paper No – 3

- ★ Use Blue / Black Ball pen only.
- ★ Please do not make any stray 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 darkened / half darkened circle might be rejected.

| | | |
|--------------------|----------------|------------------|
| Start time : _____ | End time _____ | Time taken _____ |
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1. Name (in Block Letters)

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2. Date of Exam

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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 | |
|-----------------------|--|---------|--|-----------|--|-------|--|