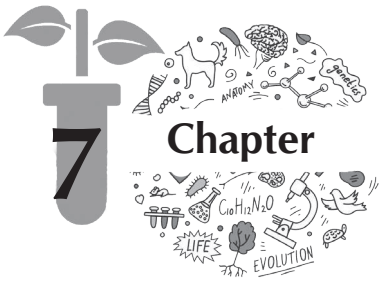


Cell Cycle and Cell Division

MULTIPLE CHOICE QUESTIONS

Topic 1 | Cell Cycle

1. All cells reproduce by dividing into_____, with each parental cells giving rise to_____ cells each time they divide.
(a) One ; four daughter
(b) Two ; two daughter
(c) One ; two daughter
(d) Two ; four daughter

2. A cell cycle is made up of all the listed events, except:
(a) Cell growth
(b) DNA replication
(c) Transcription
(d) Cell division

3. Consider the following statements-

Statement-I: Cell growth (in terms of cytoplasmic increases) is a contingent process which occur during cell cycle.

Statement-II: DNA synthesis occurs only during one specific stage in the cell cycle.

Statement-III: The events of cell cycle are under genetic control.
(a) Statement-I is false & Statement-II and III are true
(b) Statements-I and II are false & Statements-III are true
(c) All Statements are true
(d) None of the above stated statements are true.

Topic 2 | Phases of Cell Cycle

4. The G_2 of cell cycle is pronounced by-
(a) Cell growth and division
(b) Cell duplication
(c) Protein synthesis & centriole duplication
(d) Cell growth & protein synthesis

5. Find mismatch column.

	Column-I	Column-II
(a)	Karyokinesis	Separation of daughter chromosomes
(b)	Cytokinesis	Division of cytoplasm
(c)	Interphase	Smallest phase of cell cycle
(d)	M-phase	Mitosis phase

6. The inactive stage of cell cycle is-
(a) Quiescent stage (b) G_1
(c) S – phase (d) (a) and (b)

7. Choose the correct statement with respect to G_0 phase:
(a) Also known as quiescent stage and start after G_2 phase
(b) Cells of this stage remain inactive and no longer undergo proliferation
(c) Cell of this stage remain in active but no longer proliferation unless called to do so depending on the requirement of organism
(d) Cells of this stage remain active and proliferate till death without any condition

8. How many chromosome does onion somatic cell have?
(a) 12 (b) 14
(c) 16 (d) 20

9. How many number of chromosomes does onion somatic cells have in G_1, S, G_2 & M – phase respectively?
(a) 32, 16, 16, 32 (b) 16, 32, 16, 16
(c) 16, 16, 16, 16 (d) None of these

10. Mitotic division occurs in –
(a) Diploid somatic cell
(b) Haploid male honey bee
(c) (a) and (b)
(d) Gametes

11. Match the following column:

Column – I	Column – II
(a) G_1 Phase	(i) Metabolically active cell, do not proliferate
(b) S Phase	ii) Content of DNA doubled
(c) G_0 phase	iii) Synthesis of proteins
(d) G_2 Phase	iv) Metabolically active cell grows continuously

(a) a – iv), b – ii), c – i), d – iii)
(b) a – i), b – ii), c – iv), d – iii)
(c) a – iv), b – iii), c – i), d - ii
(d) None of these

12. Human cell divides once in approximately every:
(a) 60 minutes (b) 90 minutes
(c) 24 hours (d) None of these

13. Read the following statements and choose the correct option.

Statement A: The M-phase represents the phase when actual cell division occurs

Statement B: Interphase represents the phase between two successive M-phases
(a) Only Statement A is correct
(b) Only Statement B is correct
(c) Both the statements are incorrect
(d) Both the statements are correct

14. Match the columns and choose the correct option:

Column I	Column II
(a) G_1 phase	(i) Quiescent stage of the cell cycle.
(b) G_2 phase	(ii) DNA denoted as 2C, increases to 4C
(c) Synthesis phase	(iii) Proteins are synthesized in preparation for mitosis
(d) G0 phase	(iv) Cell contain initial amount of DNA i.e., 2C

(a) a-iv, b-iii, c-i, d-ii
(b) a-iv, b-iii, c-ii, d-i
(c) a-iii, b-i, c-iv, d-ii
(d) a-ii, b-iv, c-ii, d-i

15. An average duration of yeast cell cycle is-
(a) 60 minutes (b) 90 minutes
(c) 20 minutes (d) One day

16. Cell cycle is divided into how many basic phases?
(a) One (b) Two
(c) Four (d) Six

17. Which of following is/are enlisted as basic phases of cell cycle?
(a) G_0 phase (b) S phase
(c) Interphase (d) Metaphase

18. The phase of cell cycle during which mitosis occur is-
(a) Interphase (b) M-phase
(c) G-phase (d) S-phase

19. The phase between two successive M-phase is-
(a) Interphase (b) G-phase
(c) S-phase (d) M-phase

20. The time span of interphase and M-phase in an average human cell cycle is-
(a) 12 hours each
(b) 95% M-phase & one hour interphase
(c) 8 hour M-phase & 16 hour interphase
(d) One hour M-phase & 23 hour interphase

21. The correct sequence of cell is-
(a) M → G_2 → S → G_1
(b) S → G_2 → G_1 → M
(c) M → G_1 → G_2 → S
(d) G_1 → S → G_2 → M

22. The process which mark as start & usually end of M-phase are-
(a) Division of cytoplasm & karyokinesis respectively
(b) Cytokinesis and division of cytoplasm respectively
(c) Separation of daughter chromosome & cytokinesis respectively
(d) Karyokinesis & cytokinesis respectively

23. Resting phase of cell-cycle is-
(a) M-phase (b) Interkinesis
(c) G_1 & G_2 phase (d) Interphase

24. Interphase is divided into_ _ _ phases further.
(a) 4 (b) 3
(c) 2 (d) 5

25. Which of following stage corresponds to the interval between mitosis & initiation of DNA replication?
(a) S-phase (b) G_2-phase
(c) M-phase (d) G_1-phase

26. Select the correct statement about G_1 phase-
(a) Cell is metabotically inactive
(b) DNA does not replicate
(c) DNA replicate
(d) Chromosome number is doubled

27. Correct sequence of phase of M-phase is-
(a) Cytokinesis → Prophase → Metaphase →Anaphase → Telophase
(b) Prophase → Anaphase → Metaphase →Telophase → Cytokinesis
(c) G_0 → G_1→ S → G_2
(d) None of these

28. What would be amount of DNA (C) and number of chromosome (N) in animal cell just after completion of S phase if the initial amount is 2C and 2N?
(a) 2C and 2N respectively
(b) 4C and 4N respectively
(c) 4C and 2N respectively
(d) 2C and 4N respectively

29. Duplication of centriole occur in-
(a) M-phase (b) G_2-phase
(c) S-phase (d) G_0-phase

30. The S-phase of animal cell marked by-
(a) DNA replication
(b) Centriole duplication
(c) Cell growth and protein synthesis
(d) (a) and (b)

Topic 3 M-Phase

31. M – phase belongs to –
(a) Metaphase (b) Meiosis
(c) Karyokinesis (d) (a) and (b) both

32. Which one of the following is the most dramatic period of cell cycle?
(a) Gap 1 only (b) M-phase
(c) S-phase only (d) Interphase

33. Which cell equational division refer to?
(a) Meiosis
(b) Mitosis
(c) Number of cell chromosome in parent & progeny cell is same
(d) (b) and (c)

34. Karyokinesis of mitosis is divided into _____ stages.
(a) 2 (b) 3
(c) 4 (d) 8

35. Which one is the correct order of mitotic division?
(a) Metaphase → Anaphase → Prophase → Telophase
(b) Prophase → Metaphase → Anaphase → Telophase
(c) Anaphase → Telophase → Metaphase → Prophase
(d) Telophase → Prophase → Anaphase → Metaphase

Topic 4 Prophase

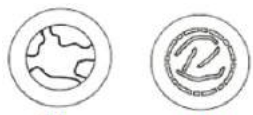
36. How do the chromosome appear during prophase of animal cell during mitosis?
(a) Consisting of four chromatid which remain attached to centromere
(b) Consisting of two chromatid which remain attached to centromere
(c) Consisting of four chromatid without centromere
(d) As chromatin material without any defined structure

37. Asters formed during prophase are –
(a) Composed of microtubules originate from centromere
(b) Composed of protein which secreted by golgi body
(c) Highly condensed area of chromosome
(d) None of these

38. What difference would indicate early prophase & late prophase of animal cell?

	Early Prophase	Late Prophase
(a)	Nucleolus & nuclear membrane present	Nucleolus & nuclear membrane are absent
(b)	Chromosomes are highly condensed	There is no condensation of chromosomes
(c)	Nucleolus & centrosome are present	Nucleolus & centromere are absent
(d)	Other organelles like ER, Golgi body complexes are not observed	Other organelles like ER, Golgi complex are observed.

39. Identify correct stage of given diagram.



(a) Late Prophase Early Prophase
(b) Early Prophase Late Prophase
(c) Metaphase Prophase
(d) Prophase Metaphase

40. Select the correct option:
(I) Prophase is first stage of Karyokinesis.
(II) It occurs after completion of protein synthesis during cell cycle
(a) Both (I) & (II) are true
(b) Both (I) & (II) are false
(c) (I) is true but (II) is false
(d) (I) is false but (II) is true

41. During prophase, which of the following occurs?
(a) Condensation of chromosomal material
(b) Chromosomal material becomes tangled
(c) Centrosome duplication
(d) Movement of both centriole at one pole of cell

42. Choose the incorrect match:
(a) Beginning of movement of chromosomes to opposite poles – Prophase
(b) Two asters with spindle – Mitotic apparatus
(c) Attachment of spindle – Metaphase
(d) Chromosomes move to opposite poles – Metaphase

43. Mitotic apparatus consist of –
(a) Four aster with spindle fibres
(b) One aster with spindle fibres
(c) Two asters with spindle fibres
(d) Centrosome with their microtubules without spindle fibres.

44. How many of following structures are observed when cells are viewed under the microscope at end of prophase? Golgi body, ER, Nucleolus, Nuclear envelop, centrosome.
(a) Zero (b) One
(c) Three (d) All of these

Topic 5 Metaphase

45. Kinetochores are
(a) Precursors of microtubules
(b) Sites of attachment of spindle fibres
(c) Site for origination of spindle fibres
(d) Small disc – shaped structure at telomere of chromosome

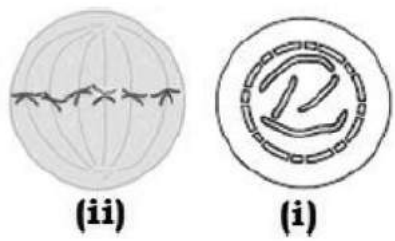
46. Metaphase is characterised by –
(a) Some chromosomes coming to lie at the pole
(b) One chromatid of each chromosome connected by its centromere to spindle fibres from one pole
(c) Sister chromatid connected by its kinetochore to spindle fibres from opposite poles
(d) All of these

47. Identify the stage:

(a) Transition to Metaphase
(b) Anaphase
(c) Metaphase
(d) Telophase

48. The complete disintegration of nuclear envelop marks the start of:
(a) Late Prophase (b) Metaphase
(c) Anaphase (d) None of these

49. Identify stage of given diagram:



(a) Early prophase, metaphase
(b) Late prophase, transition to metaphase
(c) Early prophase, transition to metaphase
(d) Late prophase, metaphase

50. Which stage of cell cycle is best to study chromosome morphology?
(a) Late Prophase (b) Early Prophase
(c) Anaphase (d) Metaphase

51. Condensation of chromosome is completed in –
(a) Stage where centrosome is duplicated
(b) Stage where DNA content is doubled
(c) Stage where complete integration of nuclear envelope occurs
(d) Stage where complete disintegration of nucleus envelope occurs

52. Metaphase chromosome is made up of –
(a) Two non – sister chromatid which are held together by centromere
(b) Four sister chromatid which are held together by centromere
(c) Two sister chromatid which are held together by centromere
(d) Four non – sister chromatid which are held together by centromere

Topic 6 Anaphase

53. At the onset of anaphase, each chromosome splits into –
(a) One chromatid
(b) Four daughter chromatids
(c) Two daughter chromosomes
(d) Eight chromatids

54. Anaphase is characterised by –
i) Migration of daughter chromatid toward equator.
ii) Centromere of each chromosome remain directed toward pole
iii) Centromere of each chromosome remain directed toward equator
iv) Chromatid split and centromere separate
v) Chromatid separate after centromere split
(a) i, ii, v (b) ii, v
(c) iii, v (d) ii, iv

55. Identify the stage –

(a) Anaphase (b) Telophase
(c) Interphase (d) Metaphase

Topic 7 Telophase

56. During telophase:
(i) Chromosome cluster at opposite spindle poles
(ii) Two daughter nuclei are formed
(iii) Chromosomes lose their individuality
(iv) It is the reversal of prophase
(v) Nucleolus is not reformed

Choose the incorrect statement:-
(a) i), (ii) (b) (iii), (iv)
(c) (v) only (d) none of these

57. Match the following column –

Column I		Column II	
a)	Syncytium	i	Divide the cytoplasm of animal cell
b)	Cell-plate	ii	Occur in liquid endosperm of coconut
c)	Cell furrow	iii	Method of cytokinesis in plant cell

(a) a-iii, b-ii, c-i
(b) a-ii, b-iii, c-i
(c) a-i, b-ii, c-iii
(d) a-ii, b-i, c-iii

58. Cell plate represents –
(a) Primary lamella
(b) Middle lamella
(c) Both
(d) Formation of plate by lysosome

Topic 8 Cytokinesis

59. Mitosis usually results in the production of-
(a) haploid daughter cells with identical genetical complement
(b) growth of multicellular organism
(c) diploid daughter cells without identical genetical complement
(d) haploid daughter cells without identical genetical complement

60. Which one is not a significance of meiosis division?
(a) Increases the genetic variability in organisms
(b) Helps in restoring of original chromosome number in a sexually reproducing species.
(c) Ensure production of haploid phase
(d) Cell repair

61. The growth in plant is/are contributed by
(a) Mitotic division in apical meristem
(b) Meiotic division in lateral meristem

(c) Meiotic division in apical meristem
(d) (a) and (b) both

62. (a) The nucleo-cytoplasmic ratio in organism is restored by mitosis
(b) The cells of the upper layer of the epidermis, cells of lining of gut, and blood cells are being constantly replaced by Mitotic division.

Choose the correct option from the following :
(a) Statement (a) is true but (b) is false
(b) Statement (b) is true but (a) is false
(c) Statement (a) & (b) are true
(d) Statement (a) & (b) are false

Topic 9 Meiosis

63. Meiosis result in-
(a) production of gametes
(b) reduction in the number of chromosomes
(c) introduction of variation
(d) all of these

64. Meiosis ensures the production of …… phase in life cycle of sexually reproduction organisms whereas fertilization restores the …….. phase.
(a) haploid & haploid respectively
(b) haploid & diploid respectively
(c) diploid & diploid respectively
(d) diploid & haploid respectively

65. Which of the following statement is correct?
(a) Meiosis involves single cycle of nuclear and cell division
(b) Doubling of chromosomes occur once during S-phase
(c) Recombination between sister chromatid of non-homologous chromosome
(d) Pairing of homologous chromosome

66. At the end of meiosis-II, how many haploidcells are formed?
(a) One (b) Two
(c) Zero (d) Four

67. Recombination occurs between –
(a) sister chromatid of non-homologous chromosomes
(b) non-sister chromatid of non-homologous chromosomes
(c) sister chromatid of homologous chromosomes
(d) non-sister chromatid of homologous chromosomes

Topic 10 Meiosis-I

68. Diakinesis is marked by –
(a) Terminalisation of chiasmata
(b) Chromosomes are fully condensed
(c) Meiotic spindle assembled
(d) All of these

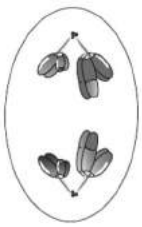
69. Meiotic spindle is assembled to prepare –
(a) Non-homologous Chromosomes for separation.
(b) Formation of aster rays.
(c) Homologous chromosome separation.
(d) Both (b) and (c)

70. Match the following

Column I		Column II	
I	Leptotene	a	Compaction of chromosome
II	Zygotene	b	Separation of chromosomes except at crossover
III	Pachytene	c	Terminalisation of chiasmata
IV	Diakinesis	d	Appearance of recombination nodules
V	Diplotene	e	Synapsis

(a) I-a, II-e, III-d, IV-c, V-b
(b) I-a, II-b, III-d, IV-c, V-e
(c) I-c, II-d, III-a, IV-e, V-b
(d) None of these

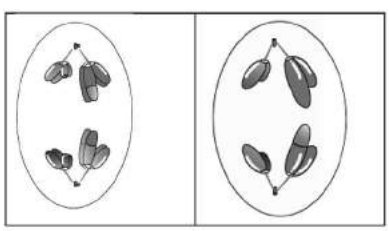
71. Identify the stage:



(a) Homologous chromosomes separate, while sister chromatids remain associated at centromere.
(b) Homologous chromosomes along with sister chromatids separate.
(c) Spindle attached to kinetochore in this stage.
(d) This stage is followed by diakinesis.

72. Spindle fibre attach to kinetochores of homologous chromosome in –
(a) Metaphase – I of meiosis
(b) Metaphase – II of meiosis
(c) Both (a) and (b)
(d) Anaphase of mitosis

73. Identify the stage:



A B

(a) A = Anaphase I, B = Anaphase II
(b) A = Anaphase II, B = Metaphase II
(c) A = Anaphase II, B = Anaphase I
(d) A = Anaphase I, B = Anaphase II

74. Dyads of cells are formed in –
(a) Telophase – I (b) Telophase – II
(c) Diakinesis (d) Both (a) and (b)

75. Longest phase of meiosis is :
(a) Prophase-I (b) Prophase-II
(c) Metaphase-I (d) Telophase-II

76. During which of the given phases, homologous chromosomes separate, while sister chromatids remain associated at their centromere?
(a) Anaphase of mitosis
(b) Anaphase II
(c) Anaphase I
(d) Metaphase I

77. Prophase-I of meiosis is divided into ……. phase based on chromosomal behaviour.
(a) 2 (b) 3
(c) 4 (d) 5

78. Identify correct sequence of prophase-I.
(a) Leptotene, Diplotene, Zygotene
(b) Zygotene, pachytene, leptotene
(c) Diplotene, Zygotene, Pachytene
(d) None of these

79. A bivalent is
(a) Pair of non-homologous chromosomes
(b) The complex formed by a pair of synapsed homologous chromosomes.
(c) Formed during pachytene statge
(d) More clearly visible at zygotene stage

80. Synaptonemal complex dissolves during-
(a) Leptotene (b) Diakinesis
(c) Zygotene (d) Diplotene

81. During which phase of meiosis centromere splits?
(a) Anaphase I (b) Anaphase II
(c) Telophase II (d) Telophase I

82. Choose the correct option with respect to Leptotene:
(i) It is the foremost and the short-lived stage of prophase
(ii) It begins when the process of compaction of chromosome is accomplished
(iii) Chromosome become visible under light microscope
(iv) It is followed by zygotene
(a) Statement (ii) is incorrect

(b) i, ii and iii are correct while (iv) is incorrect
(c) iii & iv are correct while i, ii are incorrect
(d) All statements are correct

83. Zygotene is characterized by –
(i) chromosome start pairing
(ii) non-homologous chromosome paired
(iii) synapsis occurs between non-homologous chromosomes
(iv) formation of synaptonemal complex in homologous chromosomes
(v) formation of synaptonemal complex in non-homologous chromosomes
(a) i, ii, v (b) i, iii, iv
(c) i, iv (d) i, ii, iii, v

84. Bivalent stage is –
(a) complex formed by a pair of synapsed homologous chromosomes
(b) complex formed by a pair of synapsed non-homologous chromosomes
(c) complex formed by four pair of synapsed homologous chromosomes
(d) complex formed by four pair of synapsed non-homologous chromosomes

85. Crossing over occurs in –
(a) Leptotene (b) Zzygotene
(c) Pachytene (d) Diplotene

86. Pachytene is a stage that is/are :-
(a) long lived than zygotene
(b) two chromatid of each bivalent chromosomes becomes distinct
(c) short lived than leptotene
(d) long lived than leptotene & short lived than zygotene

87. Choose the correct statement from the following:
(a) Pachytene is characterised by appearance of recombination nodule
(b) Recombination nodule is the site of crossing over
(c) Both (a) and (b)
(d) Recombination nodule formed in diplotene

88. Given below are statements (I - VI). Choose the correct set with respect to crossing over.
(I) It occurrs between sister chromatids of homologous chromosomes.
(II) It is enzyme mediated process.
(III) Recombinase enzyme is involved in it.
(IV) It occurs at recombination nodules.
(V) It occurs between non-sister chromatid of non-homologous chromosomes.
(VI) It occurs between sister chromatids of non-homologous chromosomes.
(a) I, II, III & IV (b) V, II, III & IV
(c) II, III, IV & VI (d) II, III & IV

89. Diplotene is not characterized by-
(a) Dissolution of synaptonemal complex.
(b) Tendency of recombined non-homologous chromosomes of tetrad to separate from each other, except at sites of crossover
(c) Formation of chiasmata
(d) Tendency of recombined non-homologous chromosome of bivalent to separate from each other, except at sites of crossover.

90. Chiasmata is –
(a) X – shaped structures
(b) Formed by recombined chromosome yet to be separated
(c) Site of cross over
(d) All of these

91. Which stage of Meiosis – I last for months or year in some vertebrate oocytes?
(a) Diakinesis (b) Diplotene
(c) Pachytene (d) Zygotene

Topic 11 Meiosis-II

92. Meiosis – II is initiated immediately after-
(a) Telophase – I
(b) Prophase
(c) Cytokinesis – I
(d) Chromosome have fully elongated

93. Which one of the following resembles mitosis when sister chromatids split?
(a) Meiosis – I (b) Meiosis – II
(c) Both (a) and (b) (d) None of these

94. At the beginning of Meiosis – II, a cell contain four chromatid. What number of chromatid is expected to be in each daughter cell at end of telophase – II?
(a) 4 (b) 2
(c) 8 (d) 16

95. Find mismatched column:

	Column I	Column II
(a)	Metaphase – II	Chromosomes align at equator and microtubule from opposite poles of spindle get attached to kinetochores of non-sister chromatid
(b)	Prophase – II	Nuclear membrane disappear
(c)	Telophase – II	Formation of tetrad of cells
(d)	Anaphase – II	Splitting centromere which holds sister chromatid together, allow them to move toward opposite pole of cells

96. Movement of chromatid toward opposite pole is achieved by:
(a) Shortening of microtubules attached to centromere
(b) Shortening of microtubules attached to kinetochores
(c) Elongating of microtubules attached to kinetochores
(d) Elongating of microtubules attached to centromere

97. Which one of the following is the mechanism by which the conservation of specific chromosome number of each species is achieved across generations in sexually reproducing organism ?
(a) Mitosis
(b) Meiosis only
(c) Meiosis & Mitosis
(d) None of these

98. Choose the correct statement about meiosis:
(a) Increases genetic variability of an individual of an organism
(b) Decreases genetic variability of an organism from one generation to other
(c) Reduction of chromosome by one-fourth
(d) Plays an important role in evolution

ANSWER KEY

1. (b)	2. (c)	3. (a)	4. (d)	5. (c)	6. (a)	7. (c)	8. (c)	9. (c)	10. (a)
11. (a)	12. (c)	13. (d)	14. (d)	15. (b)	16. (b)	17. (c)	18. (a)	19. (a)	20. (d)
21. (d)	22. (c)	23. (d)	24. (b)	25. (d)	26. (b)	27. (a)	28. (c)	29. (c)	30. (d)
31. (c)	32. (b)	33. (d)	34. (c)	35. (b)	36. (d)	37. (a)	38. (b)	39. (b)	40. (a)
41. (a)	42. (a)	43. (c)	44. (a)	45. (b)	46. (a)	47. (c)	48. (b)	49. (d)	50. (d)
51. (d)	52. (c)	53. (c)	54. (b)	55. (a)	56. (b)	57. (b)	58. (b)	59. (a)	60. (d)
61. (a)	62. (c)	63. (d)	64. (d)	65. (d)	66. (d)	67. (c)	68. (d)	69. (c)	70. (a)
71. (a)	72. (a)	73. (a)	74. (a)	75. (a)	76. (c)	77. (d)	78. (c)	79. (b)	80. (d)
81. (b)	82. (c)	83. (a)	84. (a)	85. (c)	86. (a)	87. (c)	88. (d)	89. (d)	90. (b)
91. (d)	92. (c)	93. (b)	94. (c)	95. (c)	96. (b)	97. (b)	98. (c)		