Ravi Maths Tuition Centre

Time : 1 Mins **CELL CYCLE AND CELL DIVISION 1** **Marks : 1057**

1. During cell cycle, two molecules of DNA are present in chromosome during
   a) G_1 phase b) Beginning of S phase c) G_2 phase d) End of M-phase
2. What happens in synthesis phase during cell Cycles ;
   a) DNA Synthesis b) Chromosome number becomes double
   c) Formation of two nuclei d) Synthesis of tubulin proteins
3. Best material to study meiosis is
   a) root tip b) ovary c) young anther d) pollen grain
4. Genetic map is one that _____ .
   a) Shows the distribution of various species in a region.
   b) Establishes sites of the genes on a chromosome.
   c) Establishes the various stages in gene evolution.
   d) Show the stages during the cell division.
5. If you are provided with root-tips of onion in your class and are asked to count the chromosomes, which of the following stages can you most conveniently look into?
   a) Metaphase b) Telophase c) Anaphase d) Prophase
6. Which part of plant is suitable for the study of melosis;
   a) Root apes b) Ovary c) Anther d) Shoot apex
7. Chromosomal morphology (Structure) is best observed at;
   a) Prophase b) Metaphase c) Interphase d) Anaphase
8. At what stage of the cell cycle are histone proteins synthesised in a eukaryotic cell?
   a) During G 2 stage of Prophase b) During S-phase
   c) During entire prophase d) During telophase
9. Best stage to observe shape, size and number of chromosomes is _____ .
   a) Interphase b) Metaphase c) Prophase d) Telophase
10. Synthesis of histone proteins occurs in
    a) G_1 phase b) interphase c) anaphase d) G_0 phase

11. If the cell is diploid in G_1 than after the S phase cell remain/become;
    a) n b) 4n c) 8n d) 2n
12. Which of the two events restore the normal number of chrmosomes in life cycle?
    a) Mitosis and Melosis b) Meiosis and fertilisation c) Fertilisation and mitosis
    d) Only melosis
13. Four different steps that occur during meiosis are given in the following list.
    (i) Complete separation of chromatids
    (ii) Pairing of homologous chromosomes
    (iii) Lining up of paired chromosomes on equator
    (iv) Crossing over between chromatids
    Select the correct sequential arrangement of the steps.
    a) (ii), (iii), (iv), (i) b) (iii), (ii), (iv), (i) c) (ii), (iv), (iii), (i) d) (iii), (i), (ii), (iv)
14. During telophase
    a) Nuclear membrance is formed b) Nucleols appears
    c) Astral rays disappear d) All the above
15. Centrosome undergo duplication during (i) of (ii) and begin to move towards opposite poles of the cell during (iii) stage of (iv).

a)

(i)	**(ii)**	**(iii)**	**(iv)**
s phase	Interphase	Prophase	Mitosis

b)

(i)	**(ii)**	**(iii)**	**(iv)**
s phase	Interphase	Anaphase	Mitosis

c)

(i)	**(ii)**	**(iii)**	**(iv)**
Prophase	Mitosis	Metaphase	Mitosis

d)

(i)	**(ii)**	**(iii)**	**(iv)**
Prophase	Mitosis	Anaphase	Mitosis

16. If a diploid cell is treated with colchicine then it becomes _____ .
    a) Triploid b) Tetraploid c) Diploid d) Monoploid
17. The correct sequence of prophase - I of melosis is;
    a) Leptotene, pachytene, zygotene, diplotene, diakinesis
    b) Leptotene, diplotene, pachytene, zygotene, diakinesis
    c) Leptotene, zygotene, pachytene, diplotene, diakinesis
    d) Leptotene, zygotene, diakinesis, diplotene
18. In which stage the DNA is doubled;
    a) Metaphase b) Anaphase c) Interphase d) Prophase
19. Anaphase Promoting Complex (APC) is a protein degradation machinery necessary for proper mitosis of animal cells. If APC is defective in a human cell, which of the following is expected to occur?
    a) Chromosomes will not condense b) Chromosomes will be fragmented
    c) Chromosomes will not segregate

d) Recombination of chromosome arms will occur

20. Match the stages of meiosis of column-I to their characteristic features in column-II and select the correct option using the codes given below :

COLUMN 1	**COLUMN 2**
A. Pachytene	(i) Pairing of homologous chromosomes
B. Metaphase I	(ii) Terminalization of chiasmata
C. Diakinesis	(iii) Crossing-over takes place
D. ZygotenE	(iv) Chromosomes align at equatorial plate

a)

A	B	C	D
(iii)	(iv)	(ii)	(i)

b)

A	B	C	D
(i)	(iv)	(ii)	(iii)

c)

A	B	C	D
(ii)	(iv)	(iii)	(i)

d)

A	B	C	D
(iv)	(iii)	(ii)	(i)

21. How many generations are required by a cell of meristem to produce 128 cells?
a) 127 b) 64 c) 32 d) 7

22. During which phase(s) of cell cycle, amount of DNA in a cell remains at 4C level if the initial amount is denoted as 2C?
a) G_0 and G_1 b) G_1 and S c) Only G_2 d) G_2 and M

23. During karyokinesis, the spindle fibres get attached to condensing chromosome at a highly differentiated region. This region is called as
a) chromomere b) chromocentre c) centriole d) kinetochore.

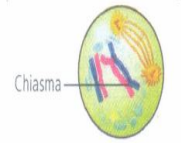
24. Lampbrush chromosomes are seen in which typical stage?
a) Mitotic anaphase b) Mitotic prophase c) Mitotic metaphase
d) Meiotic prophase

25. Four different steps that occur during meiosis are given in the following list
a) Complete separation of chromatids
b) Pairing of homologous chromosomes
c) Lining up of paired chromosomes on equator
d) Crossing over between chromatids

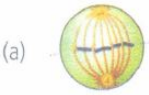
26. Read the following statements.
(i) In mitotic cell division chromosome number is halved.
(ii) Centromere is the point where two sister chromatids are held together.
(iii) The period between two successive mitotic divisions is known as telophase.
(iv) In G_1 phase of cell cycle protein and RNA are synthesised.
Which of the above given statements are correct?

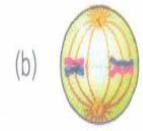
a) (i) and (iii) only b) (ii) and (iii) only c) (i) and (iv) only d) (ii) and (iv) only

27. Which of the following statements is not correct regarding colchicine?
    a) It prevents assembly of microtubules. b) It inhibits chromosome replication.
    c) It is an alkaloid. d) It is called as mitotic poison.
28. Select the correct statement about G_1 phase
    a) Cell is metabolically inactive. b) DNA in the cell does not replicate
    c) It is not a phase of synthesis of macromolecules d) Cell stops growing
29. During mitosis, E.R and nucleolus begin todisappear at:
    a) Early metaphase b) Late metaphase c) Early prophase
    d) Late prophase
30. DNA replication is found in;
    a) Mitosis and meiosis - I b) Mitosis and meiosis - I and meiosis -II
    c) meiosis only d) Mitosis only
31. The figure given below shows a cell undergoing meiosis.



    Which of the options below shows the next stage in the process?

a) 

b) 

c) 
d) 

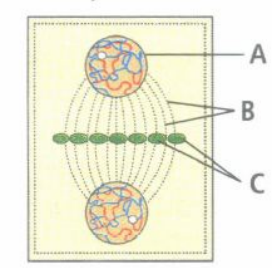
32. Which of the following not occurs in Anaphase - I
    a) Segreation of homologous chromosomes b) Shortening in spindle
    c) Poleward movement of chromosomes d) Division of centromere
33. Read the given statements which represent the features of the figures A. B, (and D. Match them correctly and select the correct option.
    (i) Chromosomes appear like a ball of wool (spireme stage)
    (ii) Reformation of nuclear envelope, nucleolus, Golgi complex and ER
    (iii) Formation of equatorial plate
    (iv) Splitting of centromeres
    a) A-(iv), B-(iii), C-(i), D-(ii) b) A-(iii), B-(iv), C-(i). D-(ii)
    c) A-(ii), B-(iii), C-(i), D-(iv) d) A-(iv), B-(ii), C-(iii), D-(i)
34. The exchange of genetic material between chromatids of paired homologous chromosomes during first meiotic division is called _____ .
    a) Transformation b) Chiasmata c) Crossing over d) Synapsis

35. If a tissue has at a given time 1024 cells, how many cycles of mitosis had the original parental single cell undergone?
    a) 512 b) 10 c) 1024 d) 256
36. Select the correct match.
    a) Quiescent phase - G_2 phase b) Synthesis phase - G_1 phase
    c) Centromere splitting - Anaphase
    d) Chromosomal condensation - Telophase
37. Identify the wrong statement about meiosis.
    a) Pairing of homologous chromosomes b) Four haploid cells are formed
    c) At the end of meiosis number of chromosomes are reduced to half
    d) Two cycles of DNA replication occur.
38. Meiosis has evolutionary significance because it results in _____ .
    a) Genetically similar daughters b) Four daughter cells c) Eggs and sperms
    d) Recombinations
39. **Assertion:** Crossing over leads to recombination of genetic material on the two chromosomes.
    Reason: Crossing over is the exchange of genetic material between two homologous chromosomes.
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion
    c) If assertion is true but reason is false
    d) If both assertion and reason are false
40. **Assertion:** Interphase occupies 75-95% of the total generation time.
    Reason: Interphase (i-phase) is the long non-dividing phase.
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion
    c) If assertion is true but reason is false
    d) If both assertion and reason are false.

41. In the meiotic cell division, 56 daughter cels are produced by two successive divisions in which
    a) First division is equational, second is reductional
    b) First division is reductional, and second is equational
    c) Both divisions are reductional d) Both divisions are equational
42. **Assertion:** The process of pairing of the chromosomes is called synapsis.
    Reason: Synapsis occurs during leptotene stage.
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion
    c) If assertion is true but reason is false
    d) If assertion is true but reason is false
43. Pre - DNA Synthesis Phase is;
    a) G_1-phase b) G_2-phase c) S- Phase d) Prophase
44. Arrange the given statements in the correct sequence of their occurrence during prophase I.
    (i) Thin thread like chromosomes with a beaded appearance
    (ii) Appearance of recombination nodules
    (iii) Formation of bivalents/tetrads
    (iv) Terminalisation of chiasmata
    (v) Appearance of chiasmata
    a) (i) $\rightarrow$ (iii) $\rightarrow$ (ii) $\rightarrow$ (v) $\rightarrow$ (iv) b) (i) $\rightarrow$ (ii) $\rightarrow$ (iii) $\rightarrow$ (iv) $\rightarrow$ (v)
    c) (i) $\rightarrow$ (iv) $\rightarrow$ (v) $\rightarrow$ (ii) $\rightarrow$ (iii) d) (i) $\rightarrow$ (iii) $\rightarrow$ (ii) $\rightarrow$ (iv) $\rightarrow$ (v)
45. In meiosis crossing over is initiated at:
    a) Diplotene b) Pachytene c) Leptotene d) Zygotene
46. Which of the events listed below is not observed during mitosis?
    a) Chromatin condensation b) Movement of centrioles to opposite poles
    c)
    Appearance of chromosomes with two chromatids joined together at the centromere
    d) Crossing over
47. Which of the following shows the correct sequence of the given mitotic stages?
    a) D $\longrightarrow$ C $\longrightarrow$ B $\longrightarrow$ A b) C $\longrightarrow$ B $\longrightarrow$ D $\longrightarrow$ A c) B $\longrightarrow$ A $\longrightarrow$ C $\longrightarrow$ D
    d) C $\longrightarrow$ B $\longrightarrow$ A $\longrightarrow$ D

48. Complex formed by a pair of synapsed homologous chromosomes is known as:
    a) Kinetochore b) Axoneme c) Equatorial plate d) Bivalent
49. **Assertion:** Cell growth results in disturbing the ratio between the nucleus and cytoplasm.
    Reason: Mitosis helps the cell to restore the nuclei generation cytoplasmic ratio.
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion
    c) If assertion is true but reason is false
    d) If both assertion and reason are false
50. The plant cell, cytokinesis occurs by
    a) Cell plate b) Invagination c) Cleavage d) Furrowing
51. Disjunction refers to
    a) the separation of homologous chromosomes at anaphase I
    b)
    the type of chromosomal aberration in which there is loss of a part of a chromosome
    c) incompatibility in fungi and other thallophytes
    d) modification of gene action by a nonallelic gene.
52. The point, at which polytene chromosomes appear to be attached together, is called _____ .
    a) Centriole b) Centromere c) Chromomere d) Chromocentre
53. Identify the stage when homologous chromosomes separate but sister chromatids remain associated.
    a) Metaphase I b) Anaphase I c) Metaphase II d) Anaphase II
54. What is true about telophase stage of mitosis?
    a) Chromosomeslosetheir identity as discrete elements
    b) Chromosomes cluster at opposite spindle poles
    c) Nuclear envelope, nucleolus, Golgi complex and ER reform. d) All of these

55. The given diagram depicts cell plate method of cytokinesis in plant cells. Identify A, B and C.



a)

A	B	C
Daughter nucleus	Phargmoplast	Vesicles

b)

A	B	C
Daughter nucleus	Vesicles	Phargmoplast

c)

A	B	C
Parent nucleus	Vesicles	Phargmoplast

d)

A	B	C
Parent nucleus	Phargmoplast	Vesicles

56. At which of the following stages, the chromosomes appear single, thin and thread like?
a) Leptotene b) Zygotene c) Pachytene d) Diplotene

57. At anaphase - II of melosis each chromosome contains ;
a) 4 DNA b) 3 - DNA c) 2 - DNA d) 1 - DNA

58. **Assertion:** Prophase is the first stage of mitosis which follows S and G_1 phases of interphase.
Reason: Prophase is marked by the initiation of clusters of chromosomes.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false
d) If both assertion and reason are false

59. **Assertion:** The final stage of meiotic prophase I is diplotene.
Reason: Diplotene is marked by terminalisation of chiasmata.

a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false
d) If both assertion and reason are false

60. Which one of the following structures will not be common to mitotic cells of higher plants?
a) Cell plate b) Centriole c) Centromere d) Spindle fibres

61. Human cells in culture show a cell cycle to be completed in approximately
a) 42 hours b) 24 hours c) 24 minutes d) 24 seconds.

62. Select the incorrect match regarding mitotic cell division.

(i) Prophase	Chromosomes begin to uncoil
(ii) Metaphase	Chromatids move apart
(iii) Telophase	The nuclear membrane reappears
(iv) Late	Each chromosome consists of two anaphase chromatids
(v) Interphase	Chromosomes are not distinct

a) (ii) and (iv) only b) (i) and (iii) only c) (ii), (iv) and (v) only
d) (i) and (v) only

63. In meiosis , nuclear membrane and nucleolus disappear during ;
a) Zygotene b) Pachytene c) Diakinesis d) Metaphase - I

64. DNA replication in bacteria occurs:
a) During S-phase b) Within nucleolus c) Prior to fission
d) Just before transcription.

65. Splindle fibres attach on to;
a) Telomere of the chromosome b) Kinetochore of the chromosome
c) Centromere of the chromosome d) Kinetosome of the chromosome

66. Colchicine is a cell poison which arrests cell division at _____and can induce_____.
a) metaphase, parthenocarpy b) anaphase, parthenocarpy
c) metaphase, polyploidy d) anaphase, polyploidy

67. Match column I with column II and select the correct option from the given codes.

	Column I		**Column II**
A.	Disintegration of nuclear membrane	(i)	Anaphase

	Column I		Column II
B.	Appearance of nucleolus	(ii)	Prophase
C.	Division of centromere	(iii)	Telophase
D.	Replication of DNA	(iv)	S-phase

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

68. Which one of the following precedes re-formation of the nuclear envelope during M phase of the cell cycle?
a) Decondensation from chromosomes, and reassembly of the nuclear lamina.
b) Transcription from chromosomes, and reassembly of the nuclear lamina.
c) Formation of the contractile ring, and formation of the phragmoplast.
d) Formation of the contractile ring, and transcription from chromosomes.

69. A cell's division time is 1 minute. In 20 minutes, a culture tube (culture medium) is 118^{th} filled with cells. When the tube will be fully filled?
a) 21 minutes b) 23 minutes c) 60 minutes d) 160 minutes

70. To produce 102 pollen grains, how many meiotic divisions are required?
a) 25 b) 25.5 c) 26 d) 27

71. Match column I with column II and select the correct option from the given codes.

	Column I		Column II
A.	Chromosomes move to equator	(i)	Pachytene
B.	Centromere splits and chromatids move apart	(ii)	Zygotene
C.	Pairing between homologous	(iii)	Anaphase chromosomes
D.	Crossing over between homolo ous chromosomes	(iv)	Metaphase

a) A-(i), B-(ii), C-(iii), D-(iv) b) A-(ii), B-(iii), C{iv), D-(i)
c) A-(iv), B-(iii), C-(ii), D-(i) d) A-(iii), B-(i), C-(iv), D-(ii)

72. The Golgi complex participates in _____ .
a) Respiration in bacteria b) Formation of secretory vesicles
c) Fatty acid breakdown d) Activation of amino acid

73. M-phase of cell cycle consist of;
a) G_1, S and G_2 , phase b) Prophase, Metaphase, Anaphase, Telophase
c) Interphase, Prophase, Metaphase, Anaphase, Teliphase d) Only Prophase

74. Balbiani rings (puffs) are sites of _____ .
a) DNA replication b) RNA and protein synthesis
c) Synthesis of polysaccharides d) Synthesis of lipids

75. **Assertion:** Some cells enter G_0 phase leading to inactivation of cell cycle.
Reason: G_0 phase occurs due to non-availability of mitogen and energy rich compounds
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false
d) If both assertion and reason are false.

76. At which stage of mitosis, the two daughter chromatids separate from each other, migrate towards the opposite poles and are now referred to as chromosomes of the future daughter nuclei?
a) Prophase b) Metaphase c) Anaphase d) Telophase

77. Select the incorrect statement regarding S phase of interphase.
a) It occurs between G_1 and G_2.
b) DNA replicates in the nucleus in this phase.
c) Centrioles duplicate in the cytoplasm.
d) As DNA is doubled, number of chromosomes also doubles

78. Which of the following is key event of anaphase of mitotic division?
a)
Chromosomes are moved to spindle equator and get aligned through spindle fibres to both poles.
b) Centromeres split and chromatids separate.
c)
Chromosomes cluster at opposite spindle poles and their identity is lost as discrete elements
d) Both (b) and (c)

79. **Assertion:** Metaphase II begins with splitting of centromere of each chromosome into two.
Reason: In Anaphase II chromosomes align at the equator.

a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false
d) If both assertion and reason are false

80. Meiosis does not occur in
a) bacteria b) cyanobacteria c) plant cell d) both (a) and (b)

81. Terminalization is related to
a) Diakinesis b) Zygotene c) Leptotene d) Pachytene

82. Thick - thread stage occured in;
a) Leptotene b) Zygotene c) Pechytene d) Diplotene

83. This phase of cell cycle is a period of intense synthesis and growth. It constitutes 95% of the duration of cell cycle. It is
a) interphase b) telophase c) prophase d) anaphase.

84. Synaptonemal complex is characterstic of ;
a) Mitotic chromosomes b) Leptodene chromosome
c) Paired Meiotic chromosomes d) Metaphase

85. Reapperance of nuclear membrance & nucleolus along with thining & elongation in chrmosomes are diagnostic characters for the phase;
a) Anaphase b) Metaphase c) Interphase d) Telophase

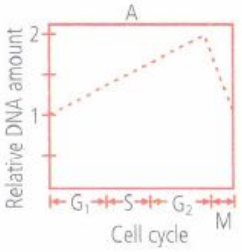
86. You are provided with floral buds of Chrysanthemum in your class and are asked to count the chromosomes, then which of the following stages would you prefer to look into?
a) Prophase b) Metaphase c) Anaphase d) Interphase

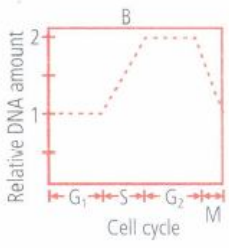
87. In which of the following stages, a chromosome is minimum coiled?
a) Interphase b) Metaphase c) Prophase d) Anaphase

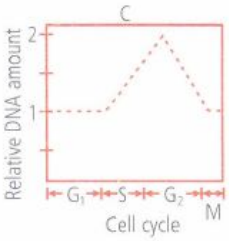
88. At what phase of meiosis there are two cells, each with separated sister chromatids that have been moved to opposite spindle poles?
a) Anaphase II b) Anaphase I c) Telophase II d) Telophase I

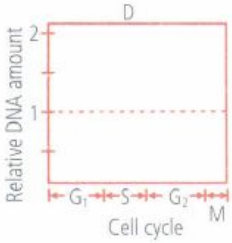
89. Zygotene of prophase-I is characterised by
a) chromomeres b) synaptonemal complex c) crossing over
d) terminalisation of chiasmata

90. Which of the following graphs shows the relative change in the amount of mitochondrial DNA of a cell undergoing mitosis?

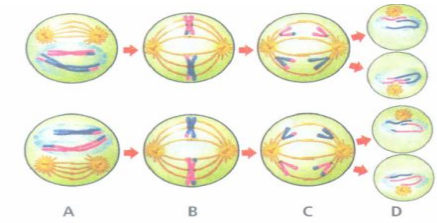
a) 

b) 

c) 

d) 

91. Refer to the given figure and select the correct statement.



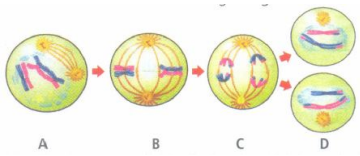
a)
In stage B homologous chromosomes are interconnected and chromosomes occur in pairs.
b) Stage A is divisible into five substages.
c) In stage D, chromosomes are not enclosed by a nuclear envelope.
d) In stage C centromeres divide and chromosomes are single stranded.

92. After meiosis - I the two chromatids of a chromosome are ;
a) Gnetically similar b) Gnetically different
c) There occurs only one chromatld in each chrmosome d) None of the above

93. Number of chromosome in primary oocyte is:
a) Same as that of secondary oocyte b) Half as that secondary oocyte
c) Double as that of secondary oocyte d) Same as that of ovum

94. Crossing over takes place in ;
a) Diplotene b) Diakinesis c) Zygotene d) pachytene

95. Refer to the given stages A, B, C and D of meiosis I and select the incorrect statement regarding them.



a)
The last stage of A is diakinesis which is marked by terminalisation of chiasmata.
b)
In stage B, microtubules from the opposite poles of the spindle attach to the pair of homologous chromosomes.
c)
In stage C, homologous chromosomes separate, while sister chromatids remain associated at their centromeres.
d)
In stage D, nuclear membrane and nucleolus disappear, cytokinesis follows and this is called as dyad of cells.

96. In melosis;
a) Division of nucleous twice but replication of DNA only once
b) Division of nucleus twice and replication of DNA twice
c) Division of nucleus once and replication of DNA is also once
d) Division of nucleus once and DNA - replication is twice

97. Which stage DNA replication takes place?
a) Metaphase b) G_1-phase c) S-phase d) G_2-phase

98. At which stage of meiosis does the genetic constitution of gametes is finally decided?
a) Metaphase I b) Anaphase II c) Metaphase II d) Anaphase I

99. Synaptionemal complex first appear;
a) Leptolene b) Pachytene c) Zygotene d) Diplotene

100. In meiosis , division of centromere occurs during ;
a) Interphase b) Anaphase - I c) Anaphase - II d) Metaphase - I

101. While in mitosis, the daughter cells resemble each other and also the parent cell; in meiosis they differ not only from parent cell in having half the number of chromosomes, but also differ among themselves qualitatively in genetic constitution due to
a) segregation and crossing over only
b) independent assortment and segregation only
c) independent assortment and crossing over only
d) crossing over,independent assortment and segregation

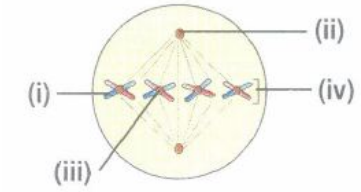
102. Separation of homologous chromosomes during Anaphase - I is called ;
a) Synapais b) Disjunction c) Nondisjunction d) Crossing Over

103. Meiosis consists of

a) two cell divisions with only two rounds of chromosome replication
b) a single cell division with chromosome replication
c) two cell divisions without any DNA replication
d) two cell divisions in which chromosome number is reduced to half

104. Which of the following options give the correct sequence of events during mitosis?
a)
condensation > nuclear membrane disassembly > crossing over > segregation > telophase
b)
condensation > nuclear membrane disassembly > arrangement at equator > centromere division > segregation > telophase
c)
condensation > crossing over > nuclear membrane disassembly > segregation > telophase
d)
condensation > arrangement at equator > centromere division > segregation > telophase

105. Identify the structures indicated by labels (i), (ii), (iii) and (iv) and select the correct option.



(i)-Chromatid, (ii)-Centriole, (iii)-Centromere,
(i)-Chromosome, (ii)-Centricie, (iii)-Centromere,
(i)-Chromatid, (ii)-Centromere, (iii)-Centriol.e,

a) (iv)-Chromosome (i)-Chromosome, (ii)-Centromere, (iii)-Centriole,
b) (iv)-Chromatid
c) (iv)-Chromosome
d) (iv)-Chromatid

106. Which of the following is longest phase of the cell cycle?
a) prophase b) Interphase c) Telophase d) M - Phase

107. In which stage of cell division , number of chromosome best counted ;
a) Prophase b) Metaphase c) Telophase d) Interphase

108. A bivalent consists of _____ .

a) Two chromatids and one centromere
b) Two chromatids and two centromeres
c) Four chromatids and two centromeres
d) Four chromatids and four centromeres

109. Best material for studying mitosis in laboratory is
a) leaf tip b) shoot tip c) root tip d) gamete.

110. Which of the following not occurs in Anaphase -I but occurs in Anaphase - II
a) condensation of chrmosomes b) poleward movement of chromosome
c) contraction of splindle fibers d) splitting of centromere

111. Synapsis occurs between:
a) Spindle fibres and centromeres b) MRNA and ribosomes
c) A male and female gamete d) Two homologous chromosomes

112. Cytokinesis in an animal cell takes place by _____ method in _____direction; while in a plant cell it occurs by _____ method in_____ direction.
a) furrowing, centrifugal, cell plate, centripetal
b) furrowing, centripetal, cell plate, centrifugal
c) cell plate, centrifugal, furrowing, centripetal
d) cell plate, centripetal, furrowing, centrifugal

113. The DNA content of individual cells and the number of cells in each phase of a "cell cycle" can be determined using flow cytometry. Which of the following combinations of "phase of a cell cycle and its corresponding DNA content" can be considered normal?
(i) Diploid cells found in the G_0 or G_1 phase.
(ii) Cells with twice the normal DNA content in the early M phase.
(iii) Cells with intermediate amounts of DNA in the S phase.
(iv) Cells with twice the normal DNA content in the G_2 phase.
a) (i) and (ii) b) (ii) and (iii) c) (iii) and (iv) d) (i), (ii), (iii) and (iv)

114. The stage during which separation of the paired homologous chromosomes begins is:
a) Diakinesis b) Diplotene c) Pachytene d) Zygotene.

115. Which one of the following statements is correct?
a) Cell divided by cytokinesis only in mitosis
b) DNA is replaced before the start of meiosis only
c) Spindles consisting of microtubules are formed only in mitosis
d) Exchage ge genetic materials occurs only in meiosis

116. Mitosis is characterised by

a) reduction division b) equal division c) both reduction and equal division
d) pairing of homologous chromosomes

117. In animals meiotic division occurs during formation. This gametic meiosis results in
a) haplontic life cycle b) diplontic life cycle c) diplohaplontic life cycle
d) none of these

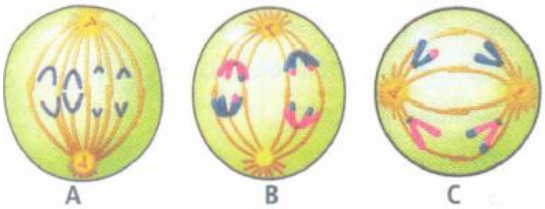
118. Match column I with column II and select the correct option from the given codes

Column I	**Column II**
A. V-shaped at anaphase	(i) Acrocentric chromosome
B. L-shaped at anaphase	(ii) Metacentric chromosome
C. J-shaped at anaphase	(iii) Telocentricchromosome
D. I-shaped at anaphase	(iv) Sub-metacentric chromosome

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

119. Condensation of chromosomes and appearance of astral rays occur during;
a) Prophase b) Metaphase c) Anaphase d) Telophase

120. If 2n = 4, then identify the figures A, B and C. as per the following codes and select the correct option.



Anaphase of meiosis I = (i)
Anaphase of mitosis = (ii)
Anaphase meiosis II = (iii)
a) A-(ij), B-(i), C-(iii) b) A-(iii), B-(ii), C-(i) c) A-(i), B-(ij), C-(iii)
d) A-(iij), B-(i), C-(ii)

121. The significance of Melosis is that it -
a) $2n \overset{Mitosis}{\longrightarrow} n \overset{Fertilization}{\longrightarrow} 2n \overset{Meiosis}{\longrightarrow} 2n$ b) $2n \overset{Meiosis}{\longrightarrow} 2n \overset{Fertilization}{\longrightarrow} 2n \overset{Mitosis}{\longrightarrow} n$
c) $2n \overset{Meiosis}{\longrightarrow} n \overset{Fertilization}{\longrightarrow} 2n \overset{Mitosis}{\longrightarrow} 2n$ d) $2n \overset{Fertilization}{\longrightarrow} (n) \overset{Mciosis}{\longrightarrow} 2n \overset{Meiosis}{\longrightarrow} n$

122. An anther has 1200 pollen grains. How many PMCs must have been there to produce them?
a) 1200 b) 300 c) 150 d) 2400

123. A bivalent of meiosis I consists of
a) two chromatids and one centromere
b) two chromatids and two centromeres

c) four chromatids and two centromeres

d) four chromatids and four centromeres

24. The cell cycle of a somatic cell usually consists of all the following, except

a)

The first part of interphase is called G_1 phase. During this, there is maximum increase in cell size and there is active synthesis of RNA and proteins

b)

In synthesis phase the DNA molecule of each chromosome replicates by synthesis of a new DNA molecule

c)

During G_2 phase a cell contains double the amount of DNA (4C) present in the original diploid cell (2n)

d) The cell cycle consists of a short interphase and long M-phase

25. Which of the following is not the feature of meiosis?

a)

Meiosis involves two sequential cycles of nuclear and cell division, meiosis I and meiosis II but only a single cycle of DNA replication.

b)

Meiosis I is initiated after the parental chromosomes have replicated to produce identical sister chromatidsat the S-phase.

c)

Meiosis involves pairing of non-homologous chromosomes and recombination between them.

d) Four haploid cells are formed at the end of meiosis II.

26. The concept of "Omnis cellula-e cellula" regarding cell division was first proposed by _____ .

a) Theodore Schwann b) Schleiden c) Aristotle d) Rudolf Virchow

27. Mitotic anaphase differs from metaphase in possessing _____ .

a) Same number of chromosomes and same number of chromatids

b) Half number of chromosomes and half number of chromatids

c) Half number of chromosomes and same number of chromatids

d) Same number of chromosomes and half number of chromatids

28. Select the incorrectly matched pair

a) Phragmoplast - Persistent spindle b) Reductional division - Meiosis I

c) Equational division - Meiosis II

d) Crossing over - Non-homologous chromosomes

29. Best material for the study of mitosis in laboratory is _____ .

a) Anther b) Root tip c) Leaf tip d) Ovary

130. In which phase of cell cycle the amount of DNA In a diploid cell become four times as compared to a haploid cell?
a) G_1 b) S c) G_2, S & M d) G_0

131. Spindle usually persists in the form of _____during ____ method of cytokinesis.
a) phragmoplast, cleavage b) phragmoplast, cell plate c) cell plate, cell plate
d) cell plate, cell plate

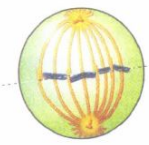
132. Which of the following is called heterotypic division;
a) Meiosis - I b) Meiosis - II c) Mitosis d) Amitosis

133. A cell cycle includes
a) interphase and M phase
b) prophase, metaphase, anaphase and telophase c) G_1, S and G_2 phases
d) karyokinesis and cytokinesis.

134. During cell cycle in which phase normal components of cell synthesized , and assembled?
a) S b) G_2 c) G_1 d) M

135. Refer to the given figure of cell division.

Which of the following options show previous stage of this process?

a)  b)  c)  d) 

136. Cells in G_0 phase:
a) Enter the cell cycle b) Suspend the cell cycle c) Terminate the cell cycle
d) Exit the cell cycle

137. Which of the following is not a characteristic feature during mitosis in somatic cells?
a) Synapsis b) Spindle fibres c) Disappearance of nucleolus
d) Centromere of the chromosome

138. Number of chromatids at metaphase is _____ .
a) Two each in mitosis and meiosis b) Two in mitosis and one in meiosis
c) Two in mitosis and four in meiosis d) One in mitosis and two in meiosis

139. Diakinesis represents ;

a) transition to prophase b) transition to metaphase
c) transition to anaphase d) transition to telophase

40. Gap between division phase and start of DNA - replication is called
a) G1 - phase b) G2 - phase c) M - Phase d) Interkinesis

41. If gametes are produced after reduction division, they are termed a
a) coenogametes b) mitogametes c) pseudogametes d) meiogametes.

42. Yeast cell divides once in approximately every
a) 90 minutes b) 9 minutes c) 24 hours d) 24 days

43. Which phase occupies the maximum part of cell cycle?
a) Mitotic phase b) Meiotic phase c) Interphase d) Cytokinesis

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

45. Meiosis-I is reductional division. Meiosis-II is equational division due to _____ .
a) Pairing of homologous chromosomes b) Crossing over
c) Separation of chromatids d) Disjunction of homologous chromosomes

46. During gamete formation, the enzyme recombinase participates during _____ .
a) Metaphase -1 b) Anaphase - II c) Prophase - 1 d) Prophase - II

47. Chromosome exhibit high level of coiling at which phase of karyokinesis;
a) Prophase b) Metaphase c) Telophase d) Interphase

48. Which of the following is true for nucleolus?
a) It takes part in spindle formation. b) It is a membrane-bound structure.
c) Larger nucleoli are present in dividing cells.
d) It is a site for active ribosomal RNA synthesis.

49. In S-phase of cell cycle:
a) Amount of DNA remains same in each cell
b) Chromosome number is increased
c) Amount of DNA is reduced to half in each cell
d) Amount of DNA doubles in each cell

50. Identify the correct statement with regard to G1 phase (Gap I) of interphase _____ .
a) Cell is metabolically active, grows but does not replicate its DNA
b) Nuclear division takes place c) DNA synthesis or replication takes place
d) Reorganisation of all cell components takes place

151. The enzyme recombinase is required at whichstage?
a) Pachytene b) Zygotene c) Diplotene d) Diakinesis

152. If the n = 16 in plant cell then what is possible in metaphase -I of melosis?
a) 32 Bivalents b) 16 Telravalents c) 16 Bivalents d) 32 Bivalents

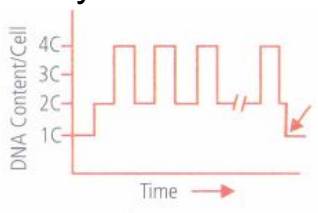
153. What is the role of NAD^+ in cellular respiration?
a) It is a nucleotide source of ATP synthesis.
b) It functions as an electron carrier. c) It functions as an enzyme.
d) It is the final electron acceptor for anaerobic respiration.

154. **Assertion:** Karyokinesis follows cytokinesis.
Reason: Karyokinesis is the division of cytoplasm into two daughter cells.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false
d) If both assertion and reason are false

155. To build up food reserves in the cytoplasm, chromosomes become unfolded to start transcription of mRNA and rRNA, during which phase of meiosis I?
a) Diakinesis b) Zygotene c) Diplotene d) Leptotene

156. The separation of two chromatids of each chromosome at early anaphase is initiated by
a) the interaction of centromere with the chromosomal fibres
b) the elongation of metaphasic spindle
c) the force of repulsion between the divided kinetochores d) all of these.

157. Given diagram shows variations in the amount of DNA of a developing eukaryote. What the arrow denotes?



a) First meiotic anaphase b) Second meiotic anaphase c) Mitotic telophase
d) Mitotic telophase

158. Microtubules are absent in
a) mitochondria b) flagella c) spindle fibres d) centriole

59. What does (i) and (ii) represent in the given flowchart?

$$\underset{(2n)}{Parent\ cell} \xrightarrow{M-I} 2\ \underset{(i)}{Daughter\ cells} \xrightarrow{M-II} 4\ \underset{(ii)}{Daughter\ cells}$$

(i) = 2n (i) = n (i) = n (i) = 2n

a) (ii) = n b) (ii) = n c) (ii) = 2n d) (ii) = 2n

60. **Assertion:** The stage between the two meiotic divisions is called interkinesis.
Reason: Interkinesis is generally short lived.

a)

If both assertion and reason are true and reason is the correct explanation of assertion

b)

If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false

d) If both assertion and reason are false

61. At which stage, the homologous chromosomes separate due to repulsion, but are yet held by chiasmata?

a) Zygotene b) Pachytene c) Diplotene d) Diakinesis

62. In meiosis, the daughter cells differ from parent cell as well as amongst themselves due to _____ .

a) Segregation, independent assortment and crossing over

b) Segregation and crossing over

c) Independent assortment and crossing over

d) Segregation and independent assortment

63. Which phase of mitosis is essentially the reverse of prophase in terms of nuclear changes?

a) S-phase b) Anaphase c) Telophase d) Interphase

64. _____ is the best stage to count the number and study the morphology of chromosomes.

a) Prophase b) Metaphase c) Anaphase d) Telophase

65. When synapsis is completed all along the chromosome, the cell is said to have entered a stage called

a) Zygotene b) Pachytene c) Diplotene d) Diakinesis

66. During meiosis I in humans, one of the daughter cells receives

a) only maternal chromosomes

b) a mixture of maternal and paternal chromosomes

c) same number of chromosomes as present in parent cell d) none of these.

67. Which of the following is wrong about G_1 phase?
a) G-1 Stage followed by Mitosis b) Cell is metabolically active
c) Cells grows continously d) Cell does not replicated its DNA

68. Chiasmata appears during;
a) Diakinesis b) Synaptotene c) Diplotene d) Leptotene

69. Spindle fibres attach on to:
a) Kinetosome of the chromosome b) Telomere of the chromosome
c) Kinetochore of the chromosome d) Centromere of the chromosome.

70. Chromosomal movement in Anaphase occurs with the help of;
a) Astral rays b) Centrioles c) NOR d) Spindle fibres

71. Which does not occurs in prophase?
a) Decondensation of chromatin b) Condensation of chromatin
c) Appearance of chromosome
d) Disapperance of nuclear membrance and nucleolus

72. During cell division in apical mieristem the nuclear membrane appears in _____ .
a) Metaphase b) Anaphase c) Telophase d) Cytokinesis

73. Identify the given stages of mitosis and select the correct option.
a)

A	B	C	D
Prophase	Metaphase	Telophase	Anaphase

b)

A	B	C	D
Metaphase	Anaphase	Prophase	Telophase

c)

A	B	C	D
Anaphase	Metaphase	Prophase	Telophase

d)

A	B	C	D
Prophase	Metaphase	Anaphase	Telophase

74. Minimum number of meiotic divisions required to produce 100 wheat grains are
a) 400 b) 125 c) 200 d) 25

75. In the somatic cell cycle _____ .

a)

In G_1 phase DNA content is double the amount of DNA present in the original cell.

b) DNA replication takes place in S-phase.

c) A short interphase is followed by a long mitotic phase.

d) G_2 phase foilows mitotic phase.

176. During ana phasic movements of chromosomes, _____of each chromosome is/are towards the pole and _____of the chromosome trail(s) behind.

a) centromere, arms b) arms, centromere c) chromatids, centromere

d) none of these

177. In which stage of mitosis, the chromosomes are composed of two chromatids?

a) Prophase & metaphase b) Anaphase and telophase

c) Prophase and telophase d) Metaphase and anaphase

178. Meiosis in diploid organisms results in

a) production of gametes b) reduction in the number of chromosomes

c) introduction of variation d) all of the above

179. Which among the following is not a prokaryote?

a) Nostoc b) Mycobacterium c) Saccharomyces d) Oscillatoria

180. **Assertion:** Variations are important for the process of evolution.

Reason: Meiosis increases the genetic variability in the population of organisms from one generation to the next.

a)

If both assertion and reason are true and reason is the correct explanation of assertion

b)

If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false

d) If both assertion and reason are false

181. The process of crossing over is assisted by which of the following enzymes?

a) Endonuclease b) Polymerase c) Ligase d) Both (a) and (c)

182. A cell at telophase stage is observed by a student in a plant brought from the field . he tells his teacher that this cell is not like other at telophase stage there is no formation of cell plate and thus the cell is containing more number of chromosomes as compared to other dividing cells. This would result in;

a) Somaclonal variation b) Polyteny c) Aneuploidy d) Polyploidy

183. Nuclear envelpoe disappears at

a) Late metaphase b) Anaphase c) Early prophase d) Late prophase

84. During anaphase I of meiosis:
a) homologous chromosomes separate
b) non-homologous chromosomes separate
c) sister chromatids chromosomes separate
d) non-sister chromatids chromosomes separate

85. Linkage is a tendency of alleles of different genes to assort together in;
a) Melosis b) Mitosis c) X - Y Linkage d) Inversion

86. During cell growth, DNA synthesis takes place in _____ .
a) S-phase b) G_1phase c) G_2-phase d) M-Phase

87. In Anaphase - I each chromosome composed of
a) One chromatid b) Two chromatid c) Four chromatid d) Many chromatid

88. The durations of mitotic stages in two situations, (A and B) are tabulated below

Phase	**Duration of Mitotic Stages(in minutes)**	
	A	**B**
Interphase	1356(22.6 h)	870 (14.5 h)
Prophase	126	54
Metaphase	24	14
Anaphase	5	3
Telophase	22	11
Total	**1533(25.6 h)**	**952(15.9 h)**

Following are some interpretations:
I. 'A' and 'B' indicate the same plant tissue grown at higher and lower temperatures respectively.
II. 'A' indicates a slow growing plant species and 'B' indicates a fast growing plant species.
III. Both 'A' and 'B' indicate dormant plant tissues with excessively long interphase.
The correct interpretations is/are
a) I and III b) II and III c) III only d) II only

89. At which of the given stages of mitosis, chromosomes appear in V. L, J and I shapes.
a) A b) B c) C d) D

90. Diplotene stage of prophase-I is characterised by

a) dissolution of synaptonemal complex

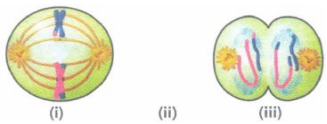
b)

separation of synapsed homologous chromosomes except at the site of crossovers

c) formation of X-shaped structures called chiasmata d) all of these.

191. Some dividing cells exit the cell cycle and enter vegetative inactive stage. This is called quiescent stage (G0). This process occurs at the end of:

a) S phase b) G2 phase c) M phase d) G1 phase

192. 

In above sequence of figures showing different stages of cell division, the missing stage (ii) is:

a)  b)  c)  d) 

193. During cell division, spindle fibers attach to which part of chromosome ;

a) Primary constriction b) Sec, constriction c) Chromomere d) Chromatid

194. "Bouqet - stage" occur in which sub stages of prophase - I?

a) Leptotene b) Zygotene c) Pachytene d) Diplotene

195. Each chromosome composed of one chromatid in;

a) Anaphase - I b) Anaphase - II c) Metaphase - I d) Metaphase - II

196. Amitosis usually occurs in

a) eukaryotic cells b) prokaryotic cells c) meristems d) spore mother cells.

197. Which one is the correct sequence of a cell cycle?

a) $G_2 \rightarrow M \rightarrow G_1 \rightarrow S$ b) $S \rightarrow G_2 \rightarrow M \rightarrow G_1$ c) $G_1 \rightarrow S \rightarrow G_2 \rightarrow M$

d) $M \rightarrow G_1 \rightarrow S \rightarrow G_2$

198. After karyogamy followed by meiosis, spores are produced exogenously in _____ .

a) Agaricus b) Alternaria c) Neurospora d) Saccharomyces

199. Chromosome duplication without nuclear division refers to

a) meiosis b) mitosis c) androgenesis d) endomitosis.

200. The correct sequence of phases of cell cycle is _____ .

a) $G_1 \rightarrow G_2 \rightarrow S \rightarrow M$ b) $S \rightarrow G_1 \rightarrow G_2 \rightarrow M$

c) $G_1 \rightarrow S \rightarrow G_2 \rightarrow M$ d) $M \rightarrow G_1 \rightarrow G_2 \rightarrow S$

201. _____ is characterised by all the chromosomes coming to lie at the equator, with one chromatid connected by its kinetochore to spindle fibres from one pole and its sister chromatid connected by its kinetochore to spindle fibres from the opposite pole.
a) Prophase b) Metaphase c) Anaphase d) Telophase

202. Which of the following phases of the cell cycle is not a part of interphase?
a) S b) G_1 c) G_0 d) M

203. In which order, cytokinesis occurs in plants ;
a) Centripetal b) Centrifugal c) obligue d) Equatorail

204. Spindle formation can be disrupted by exposing cell to the microtubule poison such as
a) high concentration of oxygen b) vitamin A c) cholesterol d) colchicine

205. The number of DNA in chromosome ar G_2 State of cell Cycle;
a) One b) Two c) Four d) Eight

206. Crossing over the results in genetic recombination in higher organisms occurs between -
a) Non -sister chromatids of a bivalent b) Two daughter nuclei
c) Two different bivalents d) Sister chromatids of a bivalents

207. _____is the best stage to count the number and study the morphology of chromosomes.
a) Prophase b) Metaphase c) Anaphase d) Telophase

208. In salivary gland chromosomes/polytene chromosomes pairing is _____ .
a) Absent b) Occasional
c) Formed between non-homologous chromosomes
d) Formed between homologous ckomosomes

209. In 'S' phase of the cell cycle:
a) Amount of DNA doubles in each cell.
b) Amount of DNA remains same in each cell.
c) Chromosome number is increased.
d) Amount of DNA is reduced to half in each cell.

210. Match column I with column II and select the correct option from the given codes.

	Column I		**Column II**
A.	Division of nucleus	(i)	Interphase
B.	Division of cytoplasm	(ii)	Cytokinesis
C.	DNA replication	(iii)	Syncytium

	Column I		Column II
D.	Karyokinesis not followed by cytokinesis	(iv)	Karyokinesis

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

211. The complex formed by a pair of synapsed homologous chromosomes is called _____ .
a) Kinetochore b) Bivalent c) Axoneme d) Equatorial plate

212. The chromosomes in which centromere is situated close to one end are:
a) Acrocentric b) Telocentric c) Sub-metacentric d) Metacentric

213. Match the column - I with column - II and select the correct answer :

	Column - I		Column - II
(A)	Pachytene	(i)	Bouguet stage
(B)	Zygotene	(ii)	Chiasma visible
(C)	Diplotene	(iii)	Terminalisation
(D)	Leptolene	(iv)	Gene exchange
(E)	Diakinesis	(v)	Synapis

a) A - i, B - ii, C-iii, D-iv, E-v b) A - iv, B - v, C-ii, D-i, E-iii
c) A - iii, B - iv, C-v, D-ii, E-i d) A - ii, B - iii, C-iv, D-i, E-v

214. Meiosis is not having the one of the charcter out of the four given below
a)
It involves two stages of DNA replication, one before melosis-I and another before meiosis - II
b) It involves recombination and crossing over
c) Sister chromatids separate during anaphase - II
d) Nuclear membrance disappears during prophase

215. **Assertion:** During anaphase, centromere of each chromosome splits and chromatids separate.
Reason: During anaphase, chromatids move to opposite poles.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false
d) If both assertion and reason are false

216. Identify the different stages with respect to the above given features and select the correct option.

(i) Thin thread like chromosomes with a beaded appearance

(ii) Appearance of recombination nodules

(iii) Formation of bivalents/tetrads

(iv) Terminalisation of chiasmata

(v) Appearance of chiasmata

a)

i	ii	iii	iv	v
Leptotene	Zygotene	Pachytene	Diplotene	Diakinesis

b)

i	ii	iii	iv	v
Leptotene	Zygotene	Pachytene	Diakinesis	Diplotene

c)

i	ii	iii	iv	v
Leptotene	Pachytene	Zygotene	Diakinesis	Diplotene

d)

i	ii	iii	iv	v
Leptotene	Pachytene	Diplotene	Zygotene	Diakinesis

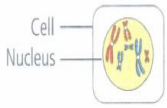
217. When the cell has started DNA replication, which check point should be predominantly activated?

a) G_1/S b) $G_{2/M \text{ and } M}$ c) G_2/M d) M

218. The term "meiosis" was given by

a) Johannsen b) Knoll and Ruska c) A. Flemming d) Farmer and Moore

219. Which of the following is correct regarding the given figure?



a)

Number of pairs of homologous chromosomes	Number of chromatids	Number of centromeres
3	6	12

b)

Number of pairs of homologus chromosomes	Number of chromatids	Number of centromeres
3	12	6

c)

Number of pairs of homologus chromosomes	Number of chromatids	Number of centromeres
6	6	12

d)

Number of pairs of homologus chromosomes	Number of chromatids	Number of centromeres
6	12	6

220. The enzyme recombinase is required at which stage of meiosis:
a) Pachytene b) Zygotene c) Diplotene d) Diakinesis

221. Read the following statements about cell division and select the correct ones.
(i) M phase represents the phase when actual cell division occurs and I phase represents the phase between two successive M phases.
(ii) In the 24 hours average duration of cell cycle of a human cell, cell division proper lasts for only about an hour.
(iii) M phase constitutes more than 95% of the duration of cell cycle
a) (i) and (ii) b) (ii) and (iii) c) (i) and (iii) d) (i), (ii) and (iii)

222. Which of the following statements is correct?
a) Animals can show mitotic divisions in both haploid and diploid cells
b) After S phase the number of chromosomes becomes double i.e., 2n to 4n.
c)
During the G_2 phase, proteins are synthesised in preparation for mitosis while cell growth continues.
d)
S or synthesis phase marks the period during which RNA synthesis takes place

223. Cells which are not dividing are likely to be at
a) G_1 b) G_2 c) G_0 d) S phase

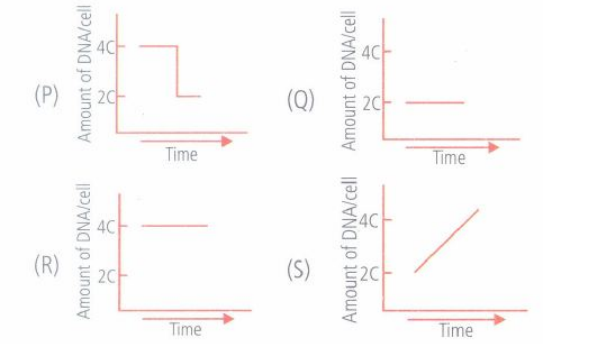
224. Preparation phase of mitosis is
a) G1 - phase b) S - Phase c) Prophase d) Interphase

225. At what phase of meiosis there are two cells, each with separated sister chromatids that have been moved to opposite spindle poles?
a) Anaphase II b) Anaphase I c) Telophase II d) Telophase I

226. Given graphs P, Q, R and S show four stages of cell cycle i.e., G1, S, G2 and M, but in random order. Identify the stages and match with the activities of the cell.
I. Taxol treatment, which prevents microtubule depolymerization, arrests the cell at this stage.
II. With a mitogen treatment, such as an epidermal growth factor, an arrested cell

at this stage proceeds to the next stage of the cell cycle.

III. The cell cycle check point at this stage confirms that DNA duplication is complete before the cell proceeds to the next stage.



a) I - P, II - Q, III - R b) I - Q, II - S, III - R c) I - R, II - Q, III - S

d) I - P, II - S, III - Q

227. **Assertion:** Small disc-shaped structures at the surface of the centromeres are called kinetochores.

Reason: Kinetochores serve as the sites of attachment of spindle fibres to the centro meres.

a)

If both assertion and reason are true and reason is the correct explanation of assertion

b)

If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false

d) If both assertion and reason are false

228. During G2 - Phase a diploid cell contains the amount of DNA equal to a ;

a) Diploid cell b) Tetraploid cell c) Haploid cell d) Nothing can be said

229. The movement of homologous chromosomes towards opposite poles occur by diassembly of spindle fibres during

a) Anaphase b) Anaphase-I c) Anaphase-II d) Metaphase

230. Which of the following statements is correct regarding G_0 phase?

a) Mitogens are present in G_0 phase.

b) Mitogens are present but energy rich compounds are absent.

c) Both mitogens and energy rich compounds are present.

d) Neither mitogens nor energy rich compounds are present.

231. In meiosis, how many cycles of chrmosome division occurs?

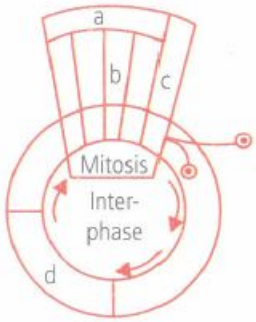
a) One b) Four c) Two d) Three

232. Lampbrush chromosomes occur during _____ .

a) Prophase of mitosis b) Diplotene of meiosis c) Metaphase of meiosis
d) Interphase

233. The role of mitosis is not merely to divide a cell into two daughter cells but to ensure genetic continuity from one cell generation to another cell generation. The mechanism ensuring genetic continuity is
a) formation of cells with new chromosomes
b) formation of two daughter cells c) formation of two cells with identival DNA
d) having the chromosome number between the two new cells.

234. The given figure is a schematic break-up of the phases/stages of cell cycle. Select the correct option regarding it.



a) 'a' represents karyokinesis which is the division of cytoplasm.
b) 'b' is telophase which is just reverse of prophase.
c) 'c' is the best phase to count total number of chromosomes in any species.
d)
In 'd' stage, replication of DNA takes place on the template of the existing DNA.

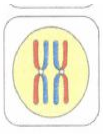
235. How many chromosome shall be present in a diploid cell at mitotic anaphse if its egg cell has ten chromosome;
a) 10 (ten) b) 20 (twenty) c) 30 (thirty) d) 40 (Forty)

236. Which of the following is correct about bivalent?
(i) Bivalents are tetrads.
(ii) A bivalent means 4 chromatids and 2 centromeres.
(iii) One bivalent consistsof 2 homologouschromosomes.
(iv) Bivalents form in zygotene
a) (i), (ii), (iii) and (iv) b) (iii) only c) (iii) and (iv) d) (iv) only

237. Which of the following correctly shows a pair of homologous chromosomes at the start of meiosis?

a) 

b) 

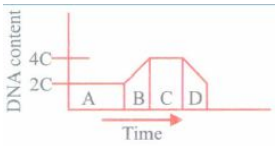
c) 

d) 

238. If the number of bivalents are 8 in metaphase - I, what shall be the number of chromosomes in daughter cells after meiosis - I and meiosis -II respectively;

a) 8 and 4 b) 4 and 4 c) 8 and 8 d) 16 and 8

239. The given graph shows the change in DNA content during various phases (A to D) in a typical mitotic cell cycle. Identify the phases and select the correct option.



a)

A	B	C	D
G_2	G_1	S	M

b)

A	B	C	D
G_2	S	G_1	M

c)

A	B	C	D
G_1	S	G_2	M

d)

A	B	C	D
M	G_1	S	G_2

240. Divison of centromere occurs in;

a) Prophase b) Metaphase c) Anaphase d) Telophase

241. In which stage DNA replication takes place?

a) Metaphase b) G_1-phase c) S-phase d) G_2-phase

242. Select the correct option with respect to mitosis

a)

Chromosomes move to the spindle equator and get aligned along the equatorial plate in metaphase

b) Chromatidsseparate but remain in the centre of the cell in anaphase

c) Chromatids start moving towards opposite poles in telophase.

d)

Golgi complex and endoplasmic reticulum are still visible at the end of prophase.

243. Meiosis-II performs _____ .

a) Separation of sex chromosomes b) Synthesis of DNA and centromeres

c) Separation of homologous chromosomes d) Separation of chromatids

244. Slipping of chiasmata towards the ends bivalent is called ;

a) Terminalisation b) Diakinesis c) Interkinesis d) Heterpycnosis

245. Splitting of centromere and hence separation of chromatids occur during

a) anaphase of mitosis b) anaphase of meiosis I c) anaphase of meiosis II

d) both (a) and (c)

246. A contractile mid body forms during cytokinesis in;

a) Animals b) Higher Plants c) Fungi d) Algae

247. Bacterium divides every 35 minutes. If a culture containing 10^5 cells per mL is grown for 175 minutes, what will be the cell concentration per mL after 175 minutes?

a) $5 \times 10^5 cells$ b) $35 \times 10^5 cells$ c) $32 \times 10^5 cells$ d) $175 \times 10^5 cells$

248. Crossing over occurs during

a) Pachytene b) Diplotene c) Diakinesis d) Zygotene

249. Mitotic spindle is mainly composed of_____proteins.
a) tubulin b) myosin c) actin d) actomyosin

250. During which stage a diploid cell becomes teraploid in mitosis ;
a) G_2 b) Prophase c) Metaphase d) Anaphase

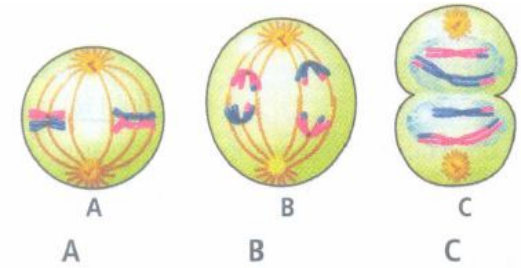
251. Cell would normally proceed to mitosis without interruption
a) once it has entered the S phase b) once it has entered the G_2 phase
c) at any time during cell division activity d) none of these.

252. During meiosis I, chromosome number
a) is reduced to half b) doubles up c) remains the same d) either (a) or (b)

253. The members of a homologous pair of chromosomes
a) are identical in size and appearance
b) contain identical genetic information
c) separate and move to opposite poles of the cell during mitosis
d) are found only in haploid cells

254. Which of the following is most important point in the regulation of cell cycle during which it must decide whether the cell will start a new cycle or will become arrested in G_0 phase?
a) S-phase b) G_1-phase c) G_2-phase d) Interphase

255. Identify the given figures showing meiotic phases and select the correct option.



a)

A	B	C
Metaphase	Anaphase	Telophase

b)

A	B	C
Metaphase I	Anaphase I	Telophase I

c)

A	B	C
Metaphase II	Anaphase II	Telophase II

d)

A	B	C
Anaphase I	Metaphase I	Telophase I

256. Phragmoplast is related to
a) division of nucleolus b) cell elongation c) cytokinesis
d) assemblage of chromosomes at metaphase.

257. In which of the following ways are mitosis and meiosis similar?

a) Both have pairing of homologous chromosomes
b) Both are preceded by DNA replication. c) Both occur in all kinds of cells.
d) Both include separation of paired chromosomes

258. During anaphasic movements of chromosomes, _____ of each chromosome is/are towards the pole and _____ of the chromosome trail(s) behind.
a) centromere, arms b) arms, centromere c) chromatids, centromere
d) none of these

259. Dissolution of the synaptonemal complex occurs during;
a) Diplotene b) Leptotene c) Pachytene d) Zygotene

260. In cell Cycle. whioch stage is misnomerly called resting during ;
a) S - Phase b) Telophase c) Cytokinesis d) Interphase

261. Pairing of homologous chromosomes is called
a) Disjunction b) Synapsis c) segregation d) Polyteny

262. The cells that do not divide further, exit G_1 phase to enter an inactive stage called _____ of the cell cycle.
a) M stage b) G_2 stage c) S stage d) G_0 stage

263. The number of chromosomes is reduced to half during
a) mitosis b) meiosis II c) meiosis I d) fertilisation.

264. **Assertion:** G_1 phase is the interval between mitosis and initiation of DNA replication
Reason: The cell is metabolically inactive during G_1 phase.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false
d) If both assertion and reason are false

265. Meiosis occurs in organisms during:
a) sexual reproduction b) vegetative reproduction
c) both sexual and vegetative reproduction d) none of these.