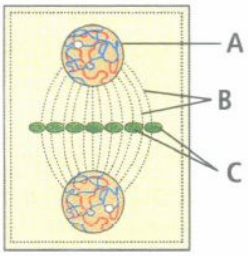
Time : 100 Mins **CELL STRUCTURE AND FUNCTION C 1** **Marks : 400**

1. 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
2. To produce 102 pollen grains, how many meiotic divisions are required?
   a) 25 b) 25.5 c) 26 d) 27
3. 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
4. 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

5. In which order, cytokinesis occurs in plants ;
   a) Centripetal b) Centrifugal c) obligue d) Equatorail
6. 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.
7. Mitosis takes place in
   a) somatic cells of animals b) meristematic cells of plant c) gonads d) Both 'a' and 'b'
8. Refer to the given figure of cell division.

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

a)  b)  c)  d) 

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9. 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.
10. 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
11. 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
12. A contractile mid body forms during cytokinesis in;
   a) Animals b) Higher Plants c) Fungi d) Algae
13. Which part of plant is suitable for the study of melosis;
   a) Root apes b) Ovary c) Anther d) Shoot apex
14. In meiosis , division of centromere occurs during ;
   a) Interphase b) Anaphase - I c) Anaphase - II d) Metaphase - I
15. Microtubules are absent in
   a) mitochondria b) flagella c) spindle fibres d) centriole
16. Pre - DNA Synthesis Phase is;
   a) G_1-phase b) G_2-phase c) S- Phase d) Prophase
17. Crossing over takes place in ;
   a) Diplotene b) Diakinesis c) Zygotene d) pachytene
18. 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
19. 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.
20. Terminalization is related to
   a) Diakinesis b) Zygotene c) Leptotene d) Pachytene
21. The chiasmata is formed during which stage of prophase-I of the meiotic cell division?

   a) Diplotene b) Pachytene c) Leptotene d) Zygotene
22. In cell Cycle. whioch stage is misnomerly called resting during ;
   a) S - Phase b) Telophase c) Cytokinesis d) Interphase
23. Choose the incorrect statement regarding mitosis.
   a) It results in the production of diploid daughter call. with identical genetic components
   b) It contributes in cell repair c) Meristematic tissue are very useful for the study of mitosis in the laboratory
   d) In multicellular animals gamete formation takes place only by mitosis
24. 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
25. Yeast cell divides once in approximately every
   a) 90 minutes b) 9 minutes c) 24 hours d) 24 days
26. If gametes are produced after reduction division, they are termed a
   a) coenogametes b) mitogametes c) pseudogametes d) meiogametes.
27. 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

28. 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

29. 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

30. _____ 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

31. 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

32. 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

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

34. Consider the following statements.
I The phragmoplast consists of a cluster of interdigitating microtubules oriented perpendicular to the future cell plate.
II. The term 'mitosis' was given by Farmer and Moore, it is a form of somatic polyploidy.
Which of the statement(s) given above is/are incorrect?
a) Only I b) Only II c) I and II d) None of these

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

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

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

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

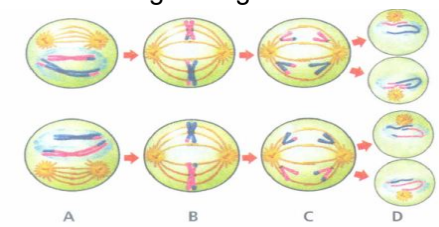
Anaphase of meiosis I = (i)
Anaphase of mitosis = (ii)
Anaphase meiosis II = (iii)
a) A-(ij), B-(i), C-(iii) b) A-(iii), B-(ii), C-(i) c) A-(i), B-(ij), C-(iii) d) A-(iij), B-(i), C-(ii)

39. 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

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

41. **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

42. 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.

43. 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.

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

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

46. 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

47. 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

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

49. **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

50. 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

51. 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

52. Consider the following statements regarding amitosis.
I. It was first discovered by J Huxley in the WBCs of chicken embryo.
II. In this division, no spindle formation and no distinct chromosome formation occurs.

Which of the statement(s) given above are correct?
a) Only I b) Only II c) I and II d) None of these

53. The plant cell, cytokinesis occurs by
a) Cell plate b) Invagination c) Cleavage d) Furrowing

54. Formation of bivalents during meiosis occurs at
a) leptotene b) zygotene c) pachytene d) diplotene

55. 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.

56. **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

57. 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

58. Which phase of mitosis is essentially the reverse of prophase in terms of nuclear changes?
a) S-phase b) Anaphase c) Telophase d) Interphase

59. Crossing over occurs during
a) Pachytene b) Diplotene c) Diakinesis d) Zygotene

60. 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

61. 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

62. 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

63. 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

64. 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.

65. Slipping of chiasmata towards the ends bivalent is called ;
a) Terminalisation b) Diakinesis c) Interkinesis d) Heterpycnosis

66. 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)

67. Each chromosome composed of one chromatid in;
a) Anaphase - I b) Anaphase - II c) Metaphase - I d) Metaphase - II

68. 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

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

70. **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

71. The process of crossing over is assisted by which of the following enzymes?
a) Endonuclease b) Polymerase c) Ligase d) Both (a) and (c)

72. 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

73. 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.

74. 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

75. Best material for the study of mitosis in laboratory is _____ .
a) Anther b) Root tip c) Leaf tip d) Ovary

76. 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

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

78. 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
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)

79. 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

80. 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

81. If a diploid cell is treated with colchicine then it becomes _____ .
a) Triploid b) Tetraploid c) Diploid d) Monoploid

82. After karyogamy followed by meiosis, spores are produced exogenously in _____ .
a) Agaricus b) Alternaria c) Neurospora d) Saccharomyces

83. If the cell is diploid in G_1 than after the S phase cell remain/become;

a) n b) 4n c) 8n d) 2n

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

85. The major event that occurs during the anaphase of mitosis, which brings about the equal distribution of chromosomes is
a) replication of the genetic material b) splitting of the chromatids c) splitting of the centromeres
d) condensation of the chromatin

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

87. 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

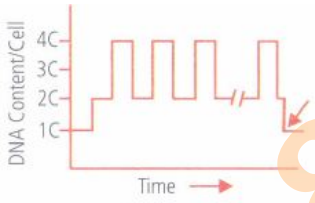
88. Which of the following is not a characteristic feature during mitosis in somatic cells?
a) Synapsis b) Spindle fibres c) Disappearance of nucleolus d) Centromere of the chromosome

89. **Assertion:** DNA synthesis occurs in interphase of cell cycle.
Reason: During G_1 and G_2-phase, the DNAcontents become double.
a) Both Assertion and Reason are true and Reason is the Correct explanation of Assertion
b) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion
c) Assertion is true, but Reason is false d) Both Assertion and Reason are false

90. 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

91. **Assertion:** Meiotic division occurs in reproductive cells.
Reason: Synapsis occurs during zygotene of meiosis.
a) Both Assertion and Reason are true and Reason is the Correct explanation of Assertion
b) Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion
c) Assertion is true, but Reason is false d) Both Assertion and Reason are false

92. 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

93. 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

94. 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

95. The point, at which polytene chromosomes appear to be attached together, is called _____ .
a) Centriole b) Centromere c) Chromomere d) Chromocentre

96. Post mitotic gap phase is characterised by all, except
a) synthesis of RNA and nucleotides b) no change in DNA content c) synthesis of histone proteins
d) growth phase of the cell

97. Best stage to observe shape, size and number of chromosomes is _____ .
a) Interphase b) Metaphase c) Prophase d) Telophase

98. 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

99. Chiasmata appears during;

a) Diakinesis b) Synaptotene c) Diplotene d) Leptotene

100. 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.