APPENDIX : 8

CRITERION REFERENCED TEST IN BIOLOGY WITH SCORING KEY

TEST - I
Choose the correct answer for the following statements and indicate your answer in the separate sheet by putting a tick mark ( ) against the response.

1. Karyokinesis means division of
   a) Cytoplasm into two  b) Nucleus into two  c) Protoplasm into two  c) None of these

2. Amitosis is
   a) Cleavage of the nucleus without recognizable chromosomes
   b) Division of chromosomes
   c) An indefinite division of chromosomes
   d) Chromosomes are present at the bridge

3. Which of the following is true?
   a) cytokinesis and karyokinesis occur together
   b) cytokinesis and karyokinesis are random
   c) karyokinesis precedes cytokinesis
   d) cytokinesis precedes karyokinesis

4. Which of the following occupies the longest period in a life cycle?
   a) Interphase  b) Prophase  c) Metaphase  d) Telophase

5. What changes occur in normal chromosome during its passage through an Interphase?
   a) One chromosome to two chromatids  b) One chromosome to one chromatid
   c) Two chromatids to one chromosome  d) No change occurs

6. Mitosis refers to
   a) Division of nucleus  b) Division of cytoplasm
   c) Reducing the chromosome number by half  c) Division of nucleus and cytoplasm both

7. During which of the following stages chromosomes exhibit minimum coiling?
   a) Interphase  b) Prophase  c) Metaphase  d) Anaphase

8. Amitosis usually occurs
   a) Eukaryotic cells  b) Prokaryotic cells  c) Meristems  d) Spore mother cell

9. Which plant material is best suited for studying mitosis in classroom?
   a) Anthers  b) Root tips  c) Pieces of bark  d) Shoot apex

10. The term mitosis was given by
    a) Farmer  b) Flemming  c) Boveri  d) Moore

11. Mitosis results in
    a) No change in chromosome number  b) Reduction in chromosome number
    c) Doubling of chromosome number  c) Increase in cell volume

12. Mitosis actually means
    a) Reducing in number of chromosomes  b) Division of nucleus only
    c) Division of cytoplasm only  d) Both nuclear (Karyokinesis) and cytoplasmic division (cytokinesis)

13. The chief contribution of mitosis is
    a) in increasing the mass  b) in producing cells genetically similar to the parent cell
    a) in occurring in every tissue of plant body  d) in completing the process very swiftly
14. Mitosis is significant because it
   a) can occur in all the parts of the plant body  b) is completed very rapidly
   c) produces identical cells .       d) can take place under favourable conditions

15. 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 identical DNA  d) halving the chromosome between the two new cells

16. During which of the following stages, the nucleus has the maximum size
   a) Interphase    b) Prophase    c) Metaphase   d) Anaphase

17. During mitosis, nuclear membrane disappears at
   a) early prophase   b) late prophase    c) metaphase   d) anaphase

18. The cells become viscous and refractive for the first time in
   a) Interphase    b) Prophase    c) Metaphase   d) Telophase

19. During prophase, the chromosomes are
   a) Larger and straight  b) Large and coiled
   c) Contracted and      d) Thick and uncoiled

20. The nuclear membrane disintegrates and spindle appears at
   a) Early prophase b) Pro metaphase c) Late telophase d) Late prophase

21. Cellular structures which always disappear during mitosis are
   a) Plastids and mitochondria   b) Nuclear envelope & Nucleolus
   c) Cell wall and plasmalemma   d) None of these

22. The spindle fibres arise from
   a) Centriole b) Centromere c) Nucleus d) Mitochondria

23. Spindle fibres are composed of
   a) Lipids b) Proteins c) Pectins d) Cellulose

24. The attachment of a chromosome to the spindle fibre is brought about by
   a) Chromomere b) Centromere c) Satellite region d) Centriole

25. The stage of mitosis during which the nucleolus disappears and chromosomes appear is known as
   a) Interphase b) Metaphase c) Anaphase d) Prophase

26. A stage of mitosis in which chromosomes get arranged in the form of an equatorial plane in the enter
   of a dividing cell is called
   a) Prophase b) Metaphase c) Anaphase d) Telophase

27. In which phase of mitosis the chromatids of chromosomes separate from each other
   a) Anaphase b) Telophase c) Metaphase d) Prophase

28. The centromere of chromosome divides into two during
   a) Early prophase b) Late prophase c) Metaphase d) Anaphase

29. 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 the above

30. The most active phase in cell division is
   a) Prophase b) Anaphase c) Metaphase d) Telophase
31. The movement of chromosomes is
   a) Independent of spindle fibres  
   b) Dependent upon the association of spindle fibres
   c) Due to cytoplasmic streaming 
   d) Due to excess of ATP generated by mitochondria

32. During mitosis, metaphase differs from anaphase in having
   a) Same number of chromosomes and half 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 same number of chromatids

33. Interzonal fibres occur in
   a) Prophase 
   b) Early metaphase 
   c) Late metaphase 
   d) Anaphase

34. During cell division, the splited chromosomes move towards opposite poles due to
   a) Microtubules 
   b) Centrioles 
   c) cytoplasmic streaming 
   d) phragmoplast

35. Which of the following phase is opposite to prophase?
   a) Metaphase 
   b) Anaphase 
   c) Telophase 
   d) Interphase

36. The failure of cytokinesis following karyokinesis results in
   a) two cells with one nucleus 
   b) one cell with two nuclei 
   c) two cells, both without nuclei 
   d) one cell with nucleus, one without nucleolus

37. In a plant cell, cytokinesis occurs by
   a) separation of the cytoplasm from the periphery to central region 
   b) separation of the cytoplasm from cell center to its periphery
   c) separation of the cytoplasm throughout the equatorial plane simultaneously
   d) furrowing of cytoplasm from two sides at right angles to the plane of spindle pole

38. How many times mitotic divisions will take place to produce 512 cells from a single parent cell?
   a) 9 
   b) 256 
   c) 158 
   d) 510

39. Phragmoplast is related to
   a) Division of nucleolus 
   b) Cell elongation 
   c) Assemblage of chromosome at metaphase

40. Mitosis can occur in
   a) haploid cells only 
   b) diploid cells only 
   c) cboth 
   d) pollen mother cells

41. Mitosis is significant because
   a) it produces identical cells 
   b) it can occur underground parts 
   c) it can occur in all parts 
   d) it is completed very rapidly

42. How many divisions must occur in a cell root tip to form 128 cells?
   a) 128 
   b) 127 
   c) 64 
   d) 3

43. How many times mitotic division must occur in a cell to form 1024 cells?
   a) 10 
   b) 20 
   c) 40 
   d) 64

44. Which of the following is called phragmoplast?
   a) Cell plate 
   b) Cross wall 
   c) Barrel shaped spindle fibre 
   d) Mother cell wall

45. In cancer cells
   a) Cell division stops 
   b) Meiosis takes place 
   c) Mitosis takes place 
   d) Sometimes mitosis and sometimes meiosis takes place
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TEST – II

Choose the correct answer for the following statements and indicate your answer in the separate sheet by putting a tick mark ( ) against the response.

1. The cell which undergoes reduction division is called
   a) Androcyte    b) Meiocyte    c) Zygote    d) Zoospore

2. Meiosis is a type of cell division in which
   a) the chromosomes maintain their original number
   b) the chromosome number is reduced to half
   c) the chromosome number is doubled
   d) the chromosome number is reduced to one fourth

3. In sexually reproducing organisms, the chromosome number is maintained by
   a) mitosis and fertilization    b) meiosis and mitosis
   c) meiosis and fertilization    d) karyokinesis and cytokinesis

4. Meiosis is significant because
   a) it produces identical cells    b) it restores original number of chromosomes
   b) there is doubling of DNA content in the cell    c) it occurs only in the somatic cells

5. All gametes are haploid
   a) It is a fact for all living organisms    b) It is a theory
   c) It is a generalised statement    d) It is a vague statement

6. Meiotic divisions in an angiosperm plant can be observed by examining cells of
   a) The apical meristem of the stem
   b) The apical dividing cells in the root tip
   c) Cells of the vascular cambium when they are dividing
   d) pollen mother cells when they are undergoing divisions in the anther

7. Meiosis in higher plants can be studied
   a) anther cell walls    b) microspore   c) microspore   d) megaspore
   mother cell

8. Zygotic meiosis occurs in
   a) Capsella    b) Chlamydomonas    c) Pteris    d) Puccinia

9. 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

10. Which is the longest stage of meiotic division?
    a) Prophase    b) Metaphase    c) Anaphase    d) Telophase

11. The sequence of stages in the prophase of meiosis is
    a) Leptotene, pachytene, zygotene, diakinesis, diplotene
    b) Leptotene, zygotene, pachytene, diplotene, diakinesis
    c) Zygote, leptotene, pachytene, diakinesis, diplotene
    d) Diplotene, diakinesis, pachytene, zygotene, leptotene.

12. In which of the following stages chromosomes appear as long thin threads
    a) Pachytene    b) Diplotene    c) Zygotene    d) Leptotene

13. Among the following which one is the longest period in the prophase of meiosis?
    a) Leptotene    b) Pachytene    c) Diplotene    d) Zygotene
14. Dyad is
   a) a pair of sister chromatids
   c) a pair of homologous chromosomes
   b) a pair of non-sister chromatids
   d) a pair of non-homologous chromosomes

15. Homologous chromosomes
   a) are from different mating parents
   c) form pairs during mitosis
   b) are from same parent
   d) exhibit crossing over at anaphase

16. Pairing of homologous chromosomes in meiosis occurs during
   a) Prophase
   b) Zygotene
   c) Leptotene
   d) Diplotene

17. Synapsis is pairing of
   a) Homologous chromosomes
   c) Acentric chromosome
   b) Non-homologous chromosomes
   d) Analogous chromosome

18. During synapsis, the number of threads (or chromonemata) in each chromosome is
   a) 1
   b) 4
   c) 8
   d) many

19. Synapsis is characteristic of
   a) Leptotene
   b) Zygotene
   c) Pachytene
   d) Diplotene

20. Synaptonemal complex is structure of
   a) Cytokinesis
   b) Terminalisation
   c) Chromosomal disjunction
   d) Chromosomal pairing

21. Chromosomes at pachytene appear to be clear bivalent
   a) clear bivalent
   b) clear tetravalent
   c) unclear monovalent
   d) unclear bivalent

22. Longitudinal splitting of chromosomes and crossing over occurs in
   a) Leptotene
   b) Zygotene
   c) Pachytene
   d) Diplotene

23. Crossing over occurs between
   a) non-sister chromatids of non-homologous chromosomes
   b) non-sister chromatids of homologous chromosomes
   c) sister chromatids of homologous chromosomes
   d) sister chromatids of homologous chromosomes

24. Crossing over involves
   a) Duplication of the chromosomes
   c) Exchange of genetic material
   b) Deletion of the chromosomes
   d) Addition of chromosomes

25. Crossing over is
   a) Expression of recessive genes
   c) Linkage between dominant genes
   b) Synapsis of homologous chromosomes
   d) Recombination between linked genes

26. How many chromosomes would be present in an organism whose gamete has 10 chromosomes?
   a) 10
   b) 30
   c) 40
   d) 50

27. Continuous variations are attributed to
   a) chromosomal aberrations
   b) polyplids
   c) mutations
   d) crossing over

28. During meiosis chiasmata are observed at
   a) Leptotene
   b) Pachytene
   c) Diplotene
   d) Diakinesis

29. The minimum number of chiasmata in a bivalent is
   a) One
   b) two
   c) three
   d) four

30. Recombination of chromosomes segments occurs during
   a) Metaphase
   b) Diplotene
   c) Diakinesis
   d) Telophase
31. Terminalisation is a process related with
   a) Diakinesis     b) Cytokinesis     c) Mitosis     d) Meiosis

32. At which stage, the homologous chromosomes separate due to repulsion, but are yet held by chiasmata
   a) Zygotene        b) Pachytene      c) Diplotene   d) Diakinesis

33. In meiosis, homologous chromosomes separate from one another in
   a) Metaphase I      b) Metaphase II     c) Anaphase I  d) Anaphase

34. The number of chromosomes present in leaf tip cells of plant species having 8 chromosomes in each of four cells of its pollen would be
   a) 12              b) 16               c) 20          d) 24

35. Bivalents in meiosis become four tetrad
   a) Leptotene    b) Meiocyte     c) Zygote     d) Zoospore

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**TEST – III**

Choose the correct answer for the following statements and indicate your answer in the separate sheet by putting a tick mark ( ) against the response

1. Meiosis involves two divisions, these divisions are,
   a) one reduction division and one cell division
   b) one reduction division and one mitotic division
   c) one nuclear division and one somatic division
   d) one equatorial division and one nuclear division

2. Which would probably occur when a diploid cell undergoes meiotic division?
   a) All homologous chromosome will separate.
   b) All daughter cells will have homologous pairs
   c) All linkage groups will be disrupted
   d) All dominant genes will segregate together into daughter cells

3. Which one of the following statements is not true for meiosis?
   a) It occurs in reproductive tissue only
   b) Chromosomes undergo pairing in early prophase
   c) Chromosomes do not exchange parts
   d) Centromeres do not divide during anaphase

4. What will be the number of chromatids in a chromosome at metaphase?
   a) 2 in mitosis and 1 in meiosis
   b) 1 in mitosis and 2 in meiosis
   c) 2 each in mitosis and meiosis
   d) 2 in mitosis and 4 in meiosis
5. Mitosis differ from meiosis in
   a) Forming four haploid cells
   b) Each chromosome duplicating itself at the beginning of the process and the separation of the
duplicates to the poles of the spindle
c) each individual chromosome being manifestly double and the pairs showing four chromatids
d) The pairing of homologous chromosomes by lying side by side (synapsis) and subsequent
   separation of homologous chromosomes into separate nuclei

6. Which of the following may be considered as antithetic to meiosis?
   a) mitosis    b) endomitosis   c) amitosis    d) fertilisation

7. Which of the following occurs only during meiosis?
   a) pairing of homologous    b) separation of duplicated strands
c) cytokinesis    d) disappearance of nucleus

8. Movement of chromosomes is
   a) independent of spindle fibres
   b) dependent upon the association of spindle fibres with kinetochores
c) due to cytoplasmic streaming
   d) due to excess of ATP generated by mitochondria

9. Cell component which transmits genetic information from one generation to another is
   a) cytoplasm    b) chromosomes   c) blood    d) mitochondria

10. Chromosomes are connected with
    a) Growth of the body    b) Respiration    c) Assimilation    d) Transmission of heredity

11. In second meiotic division anaphase is characterized by
    a) separation of homologous chromosomes
    b) separation of non homologous chromosomes
    c) separation of chromatids
    d) all of the above

12. For the formation of 160 pollens, how many meiotic divisions are required?
    a) 20    b) 30    c) 40    d) 80

13. When a cell with 40 chromosomes undergoes meiosis, each of the four resulting cells have
    a) 20 chromosomes    b) 40 chromosomes
    c) 80 chromosomes    d) 10 chromosomes

14. Haploid number of chromosomes are found in the
    a) Root tips    b) Leaf tips    c) Anther    d) Bulbil

15. For the formation of 100 pollens in wheat, how many meiotic divisions are required?
    a) 25    b) 50    c) 100    d) 150

16. During meiosis, pairing takes place between
    a) any two chromosomes
    b) two homologous chromosomes
    c) two analogous chromosomes
    d) two heterologous chromosomes

17. Number of reduction division required to produce 100 seeds is
    a) 100
    b) 125
    c) 00
    d) 250

18. The difference in the chromosomes of mitotic and meiotic prophase is the
    a) 281 chromatids respectively 40
    b) 182 chromatids respectively 30
    c) 2 chromatids in 25 both
    d) 128 chromatids respectively 20
19. Hexaploid can undergo meiosis, the statement is
   a) Correct b) Incorrect c) Rarely correct d) Absurd

20. In Prophase II, the two chromatids of each dyad has --- shaped appearance
   a) X b) Y c) O d) S

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