CHAPTER 10

CELL CYCLE AND CELL DIVISION

MULTIPLE CHOICE QUESTIONS

1. Meiosis results in
in diploid organisms
   a. Production of gametes
   b. Reduction in the number of chromosomes
   c. Introduction of variation
   d. all of the above

2. 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

3. Meiosis occurs in organisms during
   a. Sexual reproduction
   b. Vegetative reproduction
   c. Both sexual and vegetative reproduction
   d. None of the above

4. During anaphase-I of meiosis
   a. Homologous chromosomes separate
   b. Non-homologous chromosomes separate
   c. Sister chromatids separate
   d. Non-sister chromatids separate

5. Mitosis is characterised by
   a. Reduction division
   b. Equal division

c. Both reduction and equal division
d. Paining of homologous chromosomes

6. A bivalent of meiosis-I consists of
   a. Two chromatids and one centromere
   b. Two chromatids and two centromere
   c. Four chromatids and two centromere
   d. Four chromatids and four centromere

7. Cells which are not dividing are likely to be at
   a. G1
   b. G2
   c. Go
   d. S phase

8. 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

9. Identify the wrong statement about meiosis
   a. Pairing of homologous chromosomes
   b. Four haploid cells are formed
   c. At the end of meiosis the number of chromosomes are reduced to half
   d. Two cycle of DNA replication occurs

10. Select the correct statement about G1 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

VERY SHORT ANSWER TYPE QUESTIONS

1. Between a prokaryote and a eukaryote, which cell has a shorter cell division time?
2. Which of the phases of cell cycle is of longest duration?

3. Name a stain commonly used to colour chromosomes.

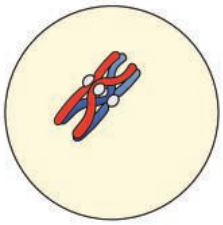
4. Which tissue of animals and plants exhibits meiosis?

5. Given that the average duplication time of *E.coli* is 20 minutes, how much time will two *E.coli* cells take to become 32 cells?

6. Which part of the human body should one use to demonstrate stages in mitosis?

7. What attributes does a chromatid require to be classified as a chromosome?

8. The diagram shows a bivalent at prophase-I of meiosis. Which of the four chromatids can cross over?



Prophase I

9. If a tissue has at a given time 1024 cells, how many cycles of mitosis had the original parental single cell undergone?

10. An anther has 1200 pollen grains. How many pollen mother cells must have been there to produce them?

11. At what stage of cell cycle does DNA synthesis take place?

12. It is said that the one cycle of cell division in human cells (eukaryotic cells) takes 24 hours. Which phase of the cycle, do you think occupies the maximum part of cell cycle?

13. It is observed that heart cells do not exhibit cell division. Such cells do not divide further and exit _____ phase to enter an inactive stage called _____ of cell cycle. Fill in the blanks.

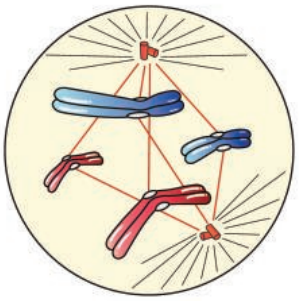
14. In which phase of meiosis are the following formed? Choose the answers from hint points given below.

    a. Synaptonemal complex _____
    b. Recombination nodules _____
    c. Appearance/activation of enzyme recombinase _____
    d. Termination of chiasmata _____
    e. Interkinesis _____
    f. Formation of dyad of cells _____

    Hints : 1) Zygotene, 2) Pachytene, 3) Pachytene, 4) Diakinesis, 5) After Telophase-I /before Meosis-II, 6) Telophase-I /After Meiosis-I.

SHORT ANSWER TYPE QUESTIONS

1. State the role of centrioles other than spindle formation.
2. Mitochondria and plastids have their own DNA (genetic material). What is known about their fate during nuclear division like mitosis?
3. Label the diagram and also determine the stage at which this structure is visible.



4. A cell has 32 chromosomes. It undergoes mitotic division. What will be the chromosome number (N) during metaphase? What would be the DNA content (C) during anaphase?
5. While examining the mitotic stage in a tissue, one finds some cells with 16 chromosomes and some with 32 chromosomes. What possible reasons could you assign to this difference in chromosome number. Do you think cells with 16 chromosomes could have arisen from cells with 32 chromosomes or vice versa?
6. The following events occur during the various phases of the cell cycle, Name the phase against each of the events.
   a. Disintegration of nuclear membrane _____
   b. Appearance of nucleolus _____
   c. Division of centromere _____
   d. Replication of DNA _____
7. Mitosis results in producing two cells which are similar to each other. What would be the consequence if each of the following irregularities occur during mitosis?
   a. Nuclear membrane fails to disintegrate
   b. Duplication of DNA does not occur
   c. Centromeres do not divide
   d. Cytokinesis does not occur.

8. Both unicellular and multicellular organisms undergo mitosis. What are the differences, if any, observed in the process between the two?

9. Name the pathological condition when uncontrolled cell division occurs.

10. Two key events take place, during S phase in animal cells, DNA replication and duplication of centriole. In which parts of the cell do events occur?

11. Comment on the statement – Meiosis enables the conservation of specific chromosome number of each species even though the process per se, results in reduction of chromosome number.

12. Name a cell that is found arrested in diplotene stage for months and years. Comment in 2-3 lines how it completes cell cycle?

13. How does cytokinesis in plant cells differ from that in animal cells?

LONG ANSWER TYPE QUESTIONS

1. Comment on the statement – Telophase is reverse of prophase.

2. What are the various stages of meiotic prophase-I? Enumerate the chromosomal events during each stage?

3. Differentiate between the events of mitosis and meiosis

4. Write brief note on the following
   a. Synaptonemal complex
   b. Metaphase plate

5. Write briefly the significance of mitosis and meiosis in multicellular organism.

6. An organism has two pair of chromosomes (i.e., chromosome number = 4). Diagrammatically represent the chromosomal arrangement during different phases of meiosis-II.