NCRT TEXTBOOK QUESTIONS SOLVED

1. What is the average cell cycle span for a mammalian cell?
Solution: 24 hours.

2. Distinguish cytokinesis from karyokinesis.
Solution: Differences between cytokinesis and karyokinesis are:

	Cytokinesis	Karyokinesis
(i)	Cytokinesis is the division of the cytoplasm of a cell.	Karyokinesis is the division of the nucleus of a cell.
(ii)	It occurs at the end of M-phase, after the nuclear division is over.	It occurs during M-phase of cell cycle before the cytokinesis begins to proceed.

3. Describe the events taking place during interphase.
Solution: The interphase, though called the resting phase, is metabolically quite active. It is the time during which the cell prepares itself for division by undergoing both cell growth and DNA replication in an orderly manner. The interphase is further divided into three phases:

- G1 (Gap 1) phase
- S (Synthesis) phase
- G2 (Gap 2) phase

G1 phase corresponds to the interval between mitosis of previous cell cycle and initiation of DNA replication. During G1 phase the cell is metabolically active and grows continuously but does not replicate its DNA S or synthesis phase marks the period during which DNA synthesis or replication takes place. During this time the amount of DNA doubles per cell. In animal cells, during the S phase, DNA replication occurs in the nucleus, and the centriole duplicates in the cytoplasm. During the G2 phase synthesis of DNA stops while cell growth continues with synthesis of protein and RNA in preparation for mitosis.

4. What is G0 (quiescent phase) of cell cycle?
Solution: G0 phase is the phase of inactivation of cell cycle due to non-availability of mitogens and energy rich compounds. Cells in this stage remain metabolically active but no longer proliferate i.e., do not grow or differentiate unless called on to do so depending on the requirement of the organism. E.g., Nerve and heart cells of chordates are in permanent G0 phase.

5. Why is mitosis called equational division?
Solution: Mitosis is a type of cell division in which chromosomes replicate and become equally distributed in two daughter nuclei so that the daughter cells come to have the same number and type of chromosomes as present in parent cell. So mitosis is called as equational division.

6. Name the stage of cell cycle at which each one of the following events occur:
(i) Chromosomes are moved to spindle equator.
(ii) Centromere splits and chromatids separate.
(iii) Pairing between homologous chromo-somes takes place.
(iv) Crossing over between homologous chromosomes takes place.
Solution:
(i) Metaphase
(ii) Anaphase
(iii) Zygotene of prophase I of meiosis 1
(iv) Pachytene of prophase I of meiosis I

7. Describe the following:
(a) Synapsis
(b) Bivalent
(c) Chiasmata
Draw a diagram to illustrate your answer.
Solution:
(a) Synapsis: During zygotene of prophase I stage homologou s chromosomes start pairing together and this process of association is called synapsis. Electron micrographs of this stage indicate that chromosome synapsis is accompanied by the formation of complex structure called synaptonemal complex.
(b) Bivalent: The complex formed by a pair of synapsed homologous chromosomes is called a bivalent or a tetrad i.e., 4 chromatids or a pair of chromosomes.

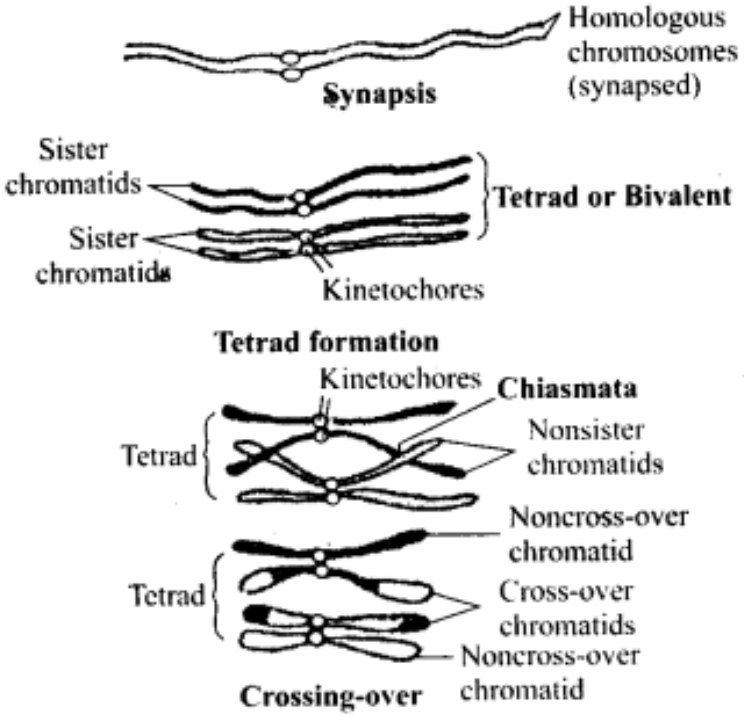

Fig.: Diagram showing synapsis, bivalent and chiasmata

(c) Chiasmata: The beginning of diplotene is recognized by the dissolution of the synaptonemal complex and the tendency of the synapsed homologous chromosomes of the bivalents to separate from each other except at the sites of crossovers. These points of attachment (X-shaped structures) between the homologous chromosomes are called chiasmata.

8. How does cytokinesis in plant cells differ from that in animal

cells?
Solnution: Plant cytokinesis and animal cytokinesis differ in following respects:

	Plant cytokinesis	Animal cytokinesis
(i)	It usually occurs by cell plate method.	It takes place by cleavage.
(ii)	The spindle usually persists during cytokinesis.	The spindle begins to degenerate soon after anaphase.
(iii)	Central part of spindle grows in size and forms an interdigited complex called phragmoplast.	A mid body of dense fibrous and vesicular material is formed in the middle.
(iv)	Vesicles derived from Golgi apparatus reach the equator of the phragmoplast and fuse to form cell plate and new cell membranes.	The event is absent in animal cytokinesis.
(v)	Cell plate grows centrifugally.	Cleavage progresses centripetally.
(vi)	The new cell membrane is derived from vesicles of Golgi apparatus.	The new cell membrane is usually derived from endoplasmic reticulum.

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