

Topic :- Cell Cycle and Cell Division

- 1 (c)
Interphase (L. inter-between, Gk, *phasis* – aspects) is a series of changes that takes place in a newly formed cell and its nucleus before it becomes capable of dividing again. It is a period of intense synthesis and growth. The interphase takes approximately 75-95% of the entire generation time. It is further divided into three periods of phases first gap or G_1 -phase, synthetic or S-phase and second gap or G_2 -phase
Duration of these phases varies in different organisms
- 2 (b)
In anaphase-I chromosome become half in number. Chromosomes split and move to opposite ends of the cell, both in anaphase-I and anaphase-II. The difference is that in anaphase-I, homologous pairs of chromosomes are split and in anaphase-II, sister chromatids are split
- 3 (d)
Colchicine ($C_{22}H_{25}O_6N$) is used to induce polyploidy. *Raphanobrassica* ($4n = 36$) was produced by **G D Karpechenko** (1927) by crossing radish (*Raphanus sativus* $2n = 18$) and cabbage (*Brassica oleracea* $2n = 18$). It is the first **allotetraploid**.
- 4 (c)
The spindle apparatus formed during cell division is composed of microtubules radiating in all directions. The microtubules are chemically composed of **tubulin** protein (α -tubulin, β -tubulin).
- 5 (a)
Ophioglossum is a genus of about 25-30 species. It is a plant. It has the highest chromosome count of any known living organism, with 1260 chromosomes. In haploid stage, 631 chromosomes in number
- 6 (a)
At telophase stage, nuclear membrane vesicles associate with the surface of individual chromosome and fuse to reform the nuclear membranes, which partially enclose cluster of chromosomes before coalescing to reform the complete nuclear envelope. During this process, the nuclear pores reassemble and reassociate to form the nuclear lamina. One of

the lamina proteins (lamina-B) remains with the nuclear membrane fragments throughout mitosis and may help nucleate reassembly. After the nucleus reforms, the pores pump in nuclear proteins, the chromosome decondense and RNA synthesis resumes, causing the nucleolus to reappear.

- 7 **(b)**
In zygotene, a filamentous ladder like nucleoprotein complex called syaptomemal complex is observed between the homologous chromosomes. It forms structural basis for pairing and synapsis of meiotic chromosomes.
- 8 **(a)**
After completion of synapsis, the cell enters the pachytene stage. Here cell remains for four days. Chromosomes are paired and occurs in synaptonemal complexes. The paired chromosomes or bivalent gets shorten and crossing over takes place
- 9 **(c)**
After M-phase, daughter cell may enter G_0 -phase, which is a stage of arrest of cell cycle, stoppage of cell division and on set of differentiation.
- 10 **(a)**
During cell division, chromosomes attaches with spindle at **kinetochore**.
- 11 **(c)**
In a spindle, negative ends of microtubules are towards the poles.
- 12 **(d)**
Pachytene or **thick thread** or **pachynema** substage is the longest substage of prophase-I of meiosis. It is characterised by the process of crossing over during which the non-sister chromatids twist around and exchange segments with each other by proper breakage and then fusion of broken ends.
- 13 **(a)**
Cell cycle consists of two basic stages. There is a long undividing stage called I-phase (interphase) and a short-dividing M-phase
- 14 **(b)**
The last substage of interphase is G_2 -phase in G_2 -phase, cell organelles increases in number and both cell and nucleus grows in size
 G_1 -phase, is the first stage of interphase during which cell organelles do not increase in number. Cell grows in size but the growth of nucleus is little. It synthesizes RNAs, proteins and other biochemical for cell growth and subsequent replication of DNA

- 15 **(a)**
In meiosis-I displacement of chiasmata takes place in diakinesis and homologous chromosomes segregate at anaphase-I.
- 16 **(c)**
Synthesis phase or S-phase is the phase in cell cycle during which DNA is replicated. The synthesis of histone proteins and RNA also takes place in this phase and each chromosome has two chromatids.
- 17 **(d)**
The directed movement of the chromosomes into position at the metaphase plate is termed as **congression**.
- 18 **(c)**
Leptotene The chromosomes appear as thin long threads and have a beaded appearance due to the presence of chromomeres
Pachytene Dissolution of the synaptonemal complex takes place in zygotene. The characteristic phenomenon during pachytene is the exchange of chromosomal segments, *i.e.*, the recombination of genes or crossing over
Diplotenes Tetrads formation takes place in pachytene stage. In diplotene the paired chromosomes begin to separate but remains united at the points of interchange of chiasma
- 19 **(c)**
The number of DNA strands in chromosome at G₂-stage of cell cycle is **four** due to the replication of DNA during S-phase.
- 20 **(a)**
Meiosis reduces chromosome number from diploid ($2n$) to haploid (n). It occurs in germ cells (eggs or sperm)

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	c	b	d	c	a	a	b	a	c	a
Q.	11	12	13	14	15	16	17	18	19	20
A.	c	d	a	b	a	c	d	c	c	a

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