Chapter 04

Cell Cycle and Cell Division

TOPIC WISE QUESTIONS

Cell cycle

Q.1 The sequence of events by which cells duplicate their genome, synthesize the other components of cell which eventually distribute into two daughter cells is called:

(1) Quiescent stage (2) Generation time

(3) Cell cycle (4) Kinetochore

Q.2 Interphase is called the resting phase because:

(1) It is the most active phase of the cell cycle

(2) There is no apparent activity related to cell division

(3) It does not prepare cell for cell division

(4) It is the phase where cell rests before entering into mitosis

Q.3 Select the incorrect statement w.r.t. cell cycle:

(1) Duplication of genes occurs twice in meiosis

(2) Karyokinesis occurs twice during meiotic division

(3) Cyclins are proteins that activate protein kinases to regulate the cell cycle

(4) After telophase-I, chromosome number is reduced to half

Q.4 What is **not** true about cell cycle ?

a. During G_1 phase, active synthesis of RNA and proteins takes place but no change in its DNA content

b. In synthesis or S phase, each chromosome carries a duplicate set of genes

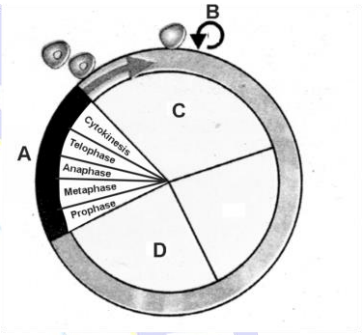
c. During G_2 phase, a cell contains double the amount (4C) of DNA present in the original diploid cell (2C)

d. In S-phase a cell doubles the original diploid (2n) chromosome number

(1) c and d (2) b and c

(3) d only (4) b, c and d

Q.5 Identify the mismatched pair:



(1) A – Starts with karyokinesis and ends with cytokinesis

(2) B – Stage where cells are inactive metabolically

(3) C – Cell grows and carries out normal metabolism

(4) D – Period of cytoplasmic growth

Q.6 Most active stage of cell cycle is:

(1) Prophase (2) Metaphase

(3) Telophase (4) Interphase

Q.7 Which of the following is the method of cytokinesis in plant cell:

(1) By cell plate formation

(2) By constriction

(3) By furrow formation

(4) (1) and (3) both

Q.8 What happens in interkinesis:

(1) DNA - replication

(2) Chromosome duplication

(3) Preparation of second meiotic div.

(4) Resting stage

Q.9 In cell cycle, changes of which stage are not visible under microscope:

(1) Interphase (2) Prophase
(3) Metaphase (4) Anaphase

Q.10 During G_2 - phase a diploid cell contains the amount of DNA equal to a:
(1) Diploid cell (2) Tetraploid cell
(3) Haploid cell (4) Nothing can be said

Q.11 A contractile mid body forms during cytokinesis in:
(1) Animals (2) Higher plants
(3) Fungi (4) Algae

Q.12 In which order, cytokinesis occurs in plants:
(1) Centripetal (2) Centrifugal
(3) Oblique (4) Equatorial

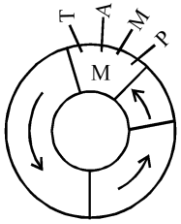
Q.13 Which of the two events restore the normal number of chromosomes in life cycle ?
(1) Mitosis and Meiosis
(2) Meiosis and fertilisation
(3) Fertilization and mitosis
(4) Only meiosis

Q.14 During cell cycle, RNA and protein synthesis takes place in:
(1) G_1 and G_2 - phase only
(2) S - phase only
(3) M - phase (4) Interphase

Q.15 A cell is bound to divide, if it has entered:
(1) G_2 - phase (2) G_1 - phase
(3) Prophase (4) S - phase

Q.16 During cell division chromosome move towards different poles due to:
(1) Centriole (2) Vacuole formation
(3) Microtubules (4) Cytokinesis

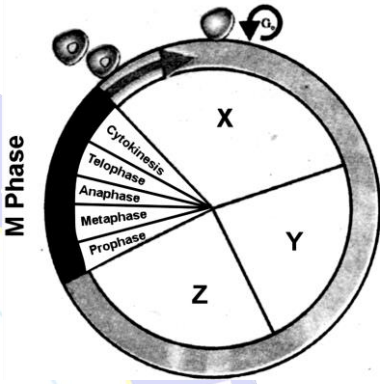
Q.17 Observe the following scheme. Which stage of cell division occurs after G_2phase ?



(1) Prophase (2) Metaphase
(3) Anaphase (4) Diakinesis

Q.18 In cell cycle, which stage is normally called resting phase:
(1) S–phase (2) Telophase
(3) Cytokinesis (4) Interphase

Q.19 The following diagram refers to a typical cell cycle.



Identify the parts marked as X, Y and Z:
(1) X-G_1, Y–S, Z–G_2 (2) X–G_2, Y–S, Z–G_1
(3) X–G_0, Y–S, Z–G_2 (4) X–G_1, Y–G_2, Z–G_0

Q.20 What happens in synthesis phase during cell cycle?
(1) DNA synthesis
(2) Chromosome number becomes double
(3) Formation of two nuclei
(4) DNA content becomes triple

Q.21 Synthesis and storage of ATP molecules required for cell div. takes place in:
(1) Prophase (2) G_1–phase
(3) Anaphase (4) G_2–phase

Q.22 Cell plate which appears during cytokinesis, ultimately transforms in:
(1) Middle lamella (2) Primary wall
(3) Sec. wall (4) Plasma membrane

Q.23 Direct or incipient cell division is:
(1) Cryptomitosis (2) Dinomitosis
(3) Amitosis (4) Mitosis and Meiosis

Q.24 Which stage of cell cycle is characterised by DNA - replication, synthesis of Histones and formation of new nucleosomes ?

(1) S-phase (2) G_1-phase

(3) G_2-phase (4) M-phase

Q.25 During cytokinesis in plants, which of the following secretes the middle lamella:

(1) Golgibody (2) SER

(3) RER (4) Lysosomes

Q.26 Cell Cycle of an ordinary animal cell:

(1) $2n \xrightarrow{\text{Mitosis}} n \xrightarrow{\text{Fertilization}} 2n \xrightarrow{\text{Meiosis}} 2n$

(2) $n \xrightarrow{\text{Meiosis}} 2n \xrightarrow{\text{Fertilization}} 2n \xrightarrow{\text{Mitosis}} n$

(3) $2n \xrightarrow{\text{Meiosis}} n \xrightarrow{\text{Fertilization}} 2n \xrightarrow{\text{Mitosis}} 2n$

(4) $2n \xrightarrow{\text{Fertilization}} (n) \xrightarrow{\text{Mitosis}} 2n \xrightarrow{\text{Meiosis}} n$

Q.27 The number of DNA in chromosome at G_2 state of cell cycle:

(1) One (2) Two

(3) Four (4) Eight

Q.28 In the somatic cell cycle:

(1) DNA replication takes place in S–phase

(2) A short interphase is followed by a long mitotic phase

(3) G_2 phase follows mitotic phase

(4) In G_1 phase DNA content is double the amount of DNA present in the original cell

Q.29 At what stage of the cell cycle are histone proteins synthesized in a eukaryotic cell:

(1) During telophase

(2) During S–phase

(3) During G_2–stage of prophase

(4) During entire prophase

Q.30 Which of the following statement is true ?

(1) Cell plate represents the middle lamella between the walls of two adjacent cells

(2) At the time of cytokinesis, organelles like mitochondria and plastids get distributed between the daughter cells.

(3) Cytokinesis in plant cell is centrifugal and takes place by cell plate formation while animal cells by furrowing and is centripetal.

(4) All of these

Q.31 In which phase of the cell cycle, sister chromatids are available as template for repair?

(1) G_1 (2) G_2 (3) S (4) M

Mitosis

Q.32 Read the following statements:

(a) Complete disintegration of the nuclear envelope marks the start of the second phase of mitosis.

(b) Metaphase chromosome is made up of one sister chromatid.

(1) Only (b) is correct

(2) Both (a) and (b) are incorrect

(3) Only (a) is correct

(4) Both (a) and (b) are correct

Q.33 The two daughter cells formed during mitosis contains:

(1) The same amount of DNA but a set of chromosomes different from those of parental cells

(2) The same amount of DNA and the same set of chromosomes as those of the parent cell

(3) Half the amount of DNA and the same set of chromosomes as those of the parent cell

(4) Double the amount of DNA and a set of chromosomes different from those of the parent cell

Q.34 Select an **incorrect** statement w.r.t. metaphase:

(1) Spindle fibres are attached to small disc shaped structure at the surface of centromeres called kinetochores

(2) The plane of alignment of the homologous pair of chromosomes at metaphase is referred to as the metaphasic plate

(3) Chromosome appears to be made up of two sister chromatids

(4) The size of chromosomes can be studied in this phase

Q.35 Best stages to study morphology and shape of chromosomes are respectively:
(1) Metaphase, Telophase
(2) Prophase, Anaphase
(3) Telophase, Anaphase
(4) Metaphase, Anaphase

Q.36 Reason of chromosomal movement in anaphase:
(1) Astral rays
(2) Centrioles
(3) Kinetochore
(4) Kinetochore and spindle fibres

Q.37 Slipping of chiasmata towards the ends of bivalent is called:
(1) Terminalisation (2) Diakinesis
(3) Interkinesis (4) Heteropycnosis

Q.38 Which does not occur in prophase ?
(1) Hydration of chromatin
(2) Dehydration of chromatin
(3) Appearance of chromosome
(4) Disappearance of nuclear membrane and nucleolus

Q.39 The cellular structure which disappear during mitosis is:
(1) Plasma membrane
(2) Nuclear membrane
(3) Mitochondria
(4) Nuclear membrane and nucleolus

Q.40 During cell division, spindle fibers attach to which part of chromosome:
(1) Primary constriction
(2) Sec. Constriction
(3) Chromomere
(4) Chromatid

Q.41 Reappearance of nuclear membrane & nucleolus along with thinning & elongation in chromosomes are diagnostic characters for the phase:
(1) Anaphase (2) Metaphase
(3) Interphase (4) Telophase

Q.42 Chromosomal morphology (Structure) is best observed at:
(1) Prophase (2) Metaphase
(3) Interphase (4) Anaphase

Q.43 In anaphase, a metacentric chromosome appears:
(1) i shaped (2) J - shaped
(3) V - shaped (4) L - shaped

Q.44 Find the correct stage sequence of mitosis (= karyokinesis)
(1) Prophase → Anaphase → Metaphase → Telophase
(2) Prophase → Metaphase → Anaphase → Telophase
(3) Prophase → Metaphase → Telophase → Anaphase
(4) Telophase → Anaphase→ Metaphase → Prophase

Q.45 Mitosis occurs in:
(1) Haploid individuals
(2) Diploid individuals
(3) Both (1) and (2)
(4) In bacteria only

Q.46 Morphology of chromosomes is most easily studied during,
(1) Metaphase (2)Prophase
(3) Anaphase (4) Telophase

Q.47 Centromere is required for:
(1) Movement of chromosomes towards poles
(2) Cytoplasmic cleavage
(3) Crossing over
(4) Transcription

Meiosis

Q.48 All are the essential stages that take place during meiosis, **except:**
(1) Two successive divisions without any DNA replication occurring between them
(2) Formation of chiasmata and crossing over
(3) Segregation of homologous chromosomes
(4) Number of chromosomes in daughter cells after meiosis II is reduced to half but the amount of DNA remains the same

Q.49 Diplotene phase of meiosis is also characterized by:

a. Desynapsis
b. Complete terminalisation of chiasmata
c. Dictyotene stage
d. Complete disappearance of nuclear membrane and nucleoli
e. Complete development of astral rays and aster
f. Longest phase of prophase-I

(1) a, b, c and e (2) b, d, e and f
(3) a, c and f (4) b, d and f

Q.50 The paradox of meiosis is:
(1) Conservation of specific chromosome number from generation to generation
(2) Produces four haploid cells after meiosis II
(3) It is a double division
(4) Does not involve DNA replication

Q.51 Which of the following not occurs in Anaphase–I but occurs in Anaphase–II ?
(1) Condensation of chromosomes
(2) Poleward movement of chromosome
(3) Contraction of spindle fibers
(4) Splitting of centromere

Q.52 Crossing over takes place in:
(1) Zygotene (2) Pachytene
(3) Diplotene (4) Diakinesis

Q.53 Number of meiosis required to produce 100 functional megaspore in angiosperms:
(1) 125 (2) 100 (3) 25 (4) 75

Q.54 Constancy of the chromosome number in sexually producing generation is brought by the process of:
(1) Meiosis (2) Mitosis
(3) Amitosis (4) None

Q.55 The synaptonemal complex appears:
(1) Between homologous chromosomes
(2) In zygotene stage
(3) Composed of DNA + protein
(4) All the above

Q.56 At anaphase - II of meiosis each chromosome contains:
(1) 4 DNA (2) 3 - DNA
(3) 2 - DNA (4) 1 - DNA

Q.57 In meiosis, nuclear membrane and nucleolus disappear during:
(1) Zygotene (2) Pachytene
(3) Diakinesis (4) Metaphase - I

Q.58 Which one of the following statement is correct?
(1) Cell divided by cytokinesis only in mitosis
(2) DNA is replicated before the start of meiosis only
(3) Spindles consisting of microtubule form only in mitosis
(4) Exchange of genetic materials occurs only in meiosis

Q.59 Which of the following not occurs in Anaphase –I?
(1) Segregation of homologous chromosomes
(2) Shortening in spindle
(3) Poleward movement of chromosomes
(4) Division of centromere

Q.60 In meiosis:
(1) Division of nucleus twice but replication of DNA only once
(2) Division of nucleus twice and replication of DNA twice
(3) Division of nucleus once and replication of DNA is also once
(4) Division of nucleus once and DNA - replication is twice

Q.61 After meiosis-I, the two chromatids of a chromosome are:
(1) Genetically similar
(2) Genetically different
(3) There occurs only one chromatid in each chromosome
(4) None of the above

Q.62 A parent cell has 16 chromosomes and 28 picogram DNA content. What must be the chromosome number and DNA content respectively in anaphase-II in each daughter cell?
(1) 8, 14 (2) 16, 14
(3) 8, 28 (4) 16, 28

Q.63 In which stage the centromeres lie at equator and arms are directed towards poles:
(1) Metaphase of mitosis
(2) Metaphase -I
(3) Metaphase -II
(4) 1 and 3 both

Q.64 Crossing over takes place on:
(1) Two stranded stage
(2) Three stranded stage
(3) One stranded stage
(4) Four stranded stage

Q.65 DNA replication is found in:
(1) Before Mitosis and before meiosis–I
(2) Mitosis and meiosis–I and meiosis–II
(3) Meiosis only
(4) Mitosis only

Q.66 How many divisions will occur in an isolated tip cell to form 128 cells.
(1) 128 (2) 127 (3) 32 (4) 7

Q.67 In which stage the Chromosomes combine and begin to separate from each other during meiosis cell division:
(1) Pachytene (2) Diplotene
(3) Zygotene (4) Diakinesis

Q.68 Number of spore mother cells required to produce 64 spores:
(1) 16 (2) 32 (3) 64 (4) 128

Q.69 The significance of Meiosis is that it:
(1) Produce four cells having chromosomal number equal to mother cell
(2) Occurs in all types of cells
(3) Maintains the constant Chromosomes number to a particular species
(4) Growth of animal body organs

Q.70 Which statement is true for mitosis:
(1) Daughter cells exhibit division of labour i.e. perform different functions
(2) Daughter cells are exactly similar in all respect
(3) Daughter cells have half the number of chromosomes as compared to mother cell
(4) Daughter cells have differences in genetic characters

Q.71 Crossing over that results in genetic recombination in higher organisms occurs between:
(1) Non-sister chromatids of a bivalent
(2) Two daughter nuclei
(3) Two different bivalents
(4) Sister chromatids of a bivalents

Q.72 In which stage of meiosis the chromosome number reduces to half:
(1) Anaphase–I (2) Anaphase–II
(3) Telophase–I (4) Telophase–II

Q.73 Chiasmata are formed as a result of:
(1) Exchange of parts of paired homologous chromosome
(2) Exchange of part of unpaired non– homologous chromosome
(3) Duplication of parts of paired homologous chromosome
(4) Loss of parts of unpaired non–homologous chromosome

Q.74 When synapsis is complete all along the chromosome, the cell is said to have entered a stage called:
(1) Zygotene (2) Pachytene
(3) Diplotene (4) Diakinesis

ANSWER KEY

TOPIC WISE QUESTIONS

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	3	2	1	3	2	4	1	3	1	2	1	2	2	4	4
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	3	1	4	1	1	4	1	3	1	1	3	2	1	2	4
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	3	3	2	2	4	4	1	1	4	1	4	2	3	2	3
Que.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	1	1	4	3	1	4	2	2	1	4	4	3	4	4	1
Que.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	
Ans.	2	2	4	4	1	2	2	1	3	2	1	1	1	2	