17/08/2024

C

Aakash
Medical | IIT-JEE | Foundations

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MM : 400 Practice Test for Botany -04 JK687 **Time : 90 Min.**

Botany

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100. (3)

Hints and Solutions

Botany

(1) **Answer :** (3)
Solution:
Mitosis is called equational division because two daughter cells have the same number of chromosomes as present in the parent cell.

(2) **Answer :** (1)
Solution:
Mature Sieve tube cell lacks nucleus.

(3) **Answer :** (3)

(4) **Answer :** (1)
Solution:
The number of bivalents = Haploid number of chromosomes

(5) **Answer :** (4)
Solution:
Chromatin material of the nucleus is stained by the basic dyes.

(6) **Answer :** (2)
Solution:
An elaborate network of filamentous proteinaceous structures present in the cytoplasm is collectively referred to as cytoskeleton.

(7) **Answer :** (2)
Hint:
The two ribosomal sub-unit remains united with each other due to a specific concentration of Mg^{2+} ions.
Solution:
When the concentration of Mg^{2+} ions is below a critical level, both ribosomal subunits get separated.

(8) **Answer :** (3)
Solution:
The figure shows Metaphase-I of Meiosis.
The bivalents are at the equator.

(9) **Answer :** (4)
Solution:
Due to meiosis, variations occur from one generation to the next.

(10) **Answer :** (4)
Hint:
Nucleolus is found in the nucleoplasm.
Solution:
Centriole takes part in the spindle formation not the nucleolus. It is the site for rRNA synthesis.

(11) **Answer :** (3)
Solution:
Germinating fatty seeds do not contain chloroplast.

(12) **Answer :** (3)
Solution:
Cells are metabolically active in G_0-phase.

(13) **Answer :** (2)
Hint:
Bivalent is a complex formed by a pair of synapsed chromosome.
Solution:
Number of bivalent formed
$= \frac{1}{2}$
[total number of chromosomes]
$= \frac{1}{2}$
(42) = 21.

(14) **Answer :** (3)
Solution:

Microfilaments are long, narrow cylindrical solid proteinaceous structures.

(15) **Answer :** (4)
Solution:
Sphaerosomes take part in storage and synthesis of fats. It is produced from SER.

(16) **Answer :** (1)
Solution:
Synapsis occurs in zygotene.

(17) **Answer :** (3)
Solution:
Mesosome is functionally similar to mitochondria.
Mesosome helps in DNA replication, respiration and secretion but it does not help in nucleotide synthesis.

(18) **Answer :** (2)
Solution:
Bacillus – rod like, Coccus – spherical, Vibrio – comma shaped, Spirillum – spiral.

(19) **Answer :** (3)

(20) **Answer :** (3)
Solution:
1 Bivalent = 4 chromatids (two pairs of sister chromatids)

(21) **Answer :** (1)
Solution:
Prophase is short and without substages. Prophase-I lacks splitting of centromere. Prophase I have crossing over phenomenon.

(22) **Answer :** (4)
Solution:
Sites of protein synthesis in eukaryotic cells are the ribosomes present in cytoplasm.

(23) **Answer :** (4)
Solution:
During zygotene stage pairing of homologous chromosomes leads to formation of synaptonemal complex. The complex formed by a pair of synapsed homologous chromosomes is called a bivalent.

(24) **Answer :** (2)
Solution:
The stage represented in the diagram is anaphase.

(25) **Answer :** (4)
Solution:
During meiosis, the daughter cells formed are genetically different from parent cell as well as from each other.

(26) **Answer :** (1)
Solution:
Synapsis occurs in zygotene. During pachytene stage, chromosomes become distinct and clearly appear as tetrad and crossing over occur between non-sister chromatids of homologous chromosomes. Synapsis and formation of bivalent occur in zygotene stage.

(27) **Answer :** (3)
Solution:
Number of cells (n) to be produced = 64
Since, number of mitotic divisions required for formation of 'n' number of cells = n – 1
$\Rightarrow 64 - 1 \Rightarrow 63$

(28) **Answer :** (3)
Solution:
In some prokaryotes like cyanobacteria, there are other membranous extensions into the cytoplasm called chromatophores which contain pigments. Reserve material in prokaryotic cells are stored in the cytoplasm in the form of inclusion bodies.

(29) **Answer :** (2)
Solution:
Meiosis I – Half number of chromosomes.

(30) **Answer :** (3)
Solution:
Peroxisomes are single membraned organelles.

(31) **Answer :** (2)
Solution:

Rudolf Virchow modified the hypothesis of Schleiden and Schwann to give cell theory its final shape. He explained that cells divided and new cells are formed from pre-existing cells.

(32) Answer : (4)
Solution:
Terminal ends of chromosomes are called telomere. Centrioles take part in forming spindle apparatus. Kinetochores are present around centromere and provide a site for attachment to the spindle fibres.

(33) Answer : (4)
Solution:
(i) Nucleolus, Golgi complex and ER reappear during telophase.
(ii) Centromere split and chromatids separate during Anaphase.

(34) Answer : (3)
Hint:
Lysosomes are simply tiny spherical-sac like structure evenly distributed in cytoplasm.
Solution:
Lysosomes are formed by process of packaging in golgi apparatus. They are bounded by single membrane and are rich in hydrolytic enzymes.

(35) Answer : (3)
Solution:
Synapsis occurs during zygotene of meiosis.

(36) Answer : (1)
Solution:
Nucleolus is the site of rRNA synthesis. It is larger and more numerous in cells actively involved in protein synthesis.

(37) Answer : (4)
Solution:
The interphase lasts more than 95% of the duration of cell cycle. In human being, in the 24 hour average duration of cell cycle, cell division proper lasts for only about one hour which is less than 5% of the average duration of cell cycle.

(38) Answer : (4)
Solution:
Mitochondria chloroplast and peroxisome are not included in endomembrane system.

(39) Answer : (1)
Solution:
Synapsis takes place in second subphase of prophase I. ***i.e.*, zygotene.**

(40) Answer : (4)

(41) Answer : (2)
Solution:
Nucleolus disappears during prophase and reappears during telophase. In haploid organisms, the gametes are formed by mitosis.

(42) Answer : (1)
Solution:
Number of chromosomes in G_1, S and G_2 phases remains the same but amount of DNA becomes double due to DNA replication in S-phase.

(43) Answer : (2)
Solution:
Presence of 70S type of ribosomes is common to prokaryotic cell, mitochondria and chloroplast.

(44) Answer : (2)

(45) Answer : (1)
Solution:
Sol.: Genetic variability increases due to Meiotic crossing over.

(46) Answer : (4)
Solution:
When karyokinesis is not followed by cytokinesis, it results in formation of syncytium.

(47) Answer : (3)
Solution:
Exocytosis is discharge of vesicles from the cell.

(48) Answer : (4)
Solution:
A polysome has several ribosomes attached to a single mRNA. Polysome translates mRNA into protein.

(49) Answer : (2)

Solution:
Interphase constitutes more than 95% duration of the cell cycle

(50) **Answer :** (2)
Hint:
Fungal cell wall is made up of chitin which is polymer of nitrogenous polysaccharide.
Solution:
(a) Fungal cell wall – polymer of N-acetylglucosamine
(b) Na^+/K^+ pump in animal cells – uphill movement
(c) Middle lamella – Calcium and magnesium pectate
(d) Plasmamembrane – Quasi fluid nature

(51) **Answer :** (1)

(52) **Answer :** (3)
Solution:
Chromosomes which have centromere very close to its one end, are J-shaped chromosomes.
Chromosomes which have their centromere very close to one end are called acrocentric chromosomes.

(53) **Answer :** (2)
Solution:
Both mitochondria and chloroplast have 70S ribosomes.

(54) **Answer :** (2)
Solution:
True pili are found only in Gram-negative bacteria.

(55) **Answer :** (1)
Solution:
Meiosis increases genetic variability in the population as it involves crossing over.

(56) **Answer :** (4)
Solution:
Mitochondria has circular double stranded DNA.

(57) **Answer :** (4)
Solution:
Interkinesis is a stage between telophase I of meiosis I and prophase II of meiosis II.

(58) **Answer :** (3)
Solution:
No division of centromere in anaphase-I but one chromosome of each homologous pair moves the opposite poles.

(59) **Answer :** (4)
Solution:
Synthesis of histone protein takes place in S phase.

(60) **Answer :** (3)
Solution:
Depending on the ease of extraction, membrane proteins can be classified as integral or peripheral.

(61) **Answer :** (3)
Solution:
• Axoneme is the part of cilia & flagella.
• Hub is the central part of centrioles.

(62) **Answer :** (2)
Hint:
Porins are found in plasma membrane.
Solution:
Porins are the proteins that form huge pores in outer membrane of plastids, mitochondria and some bacteria.

(63) **Answer :** (1)
Solution:
Duplication of chromosomes occurs in S-phase. After S-phase, each chromosome bears two chromatids.

(64) **Answer :** (2)
Solution:
DNA replicate in S phase of interphase.

(65) **Answer :** (4)
Solution:
Ribosomes help in protein synthesis.

(66) **Answer :** (4)
Solution:

Terminalisation of chiasmata takes place during diakinesis.

(67) **Answer :** (2)
Solution:
Golgi apparatus principally performs the function of packaging of materials. Lysosomes are formed due to this process.

(68) **Answer :** (3)
Solution:
Mitochondrion – is bounded by double membrane.

(69) **Answer :** (3)
Solution:
Diplotene can lasts for months or years. Extended diplotene is known as dictyotene.

(70) **Answer :** (3)
Solution:
Singer and Nicolson gave fluid mosaic model of plasma membrane.

(71) **Answer :** (3)

(72) **Answer :** (2)
Solution:
Terminalisation of chiasmata and reduction in number of chromosomes occurs during diplotene and metphase I stages respectively.

(73) **Answer :** (2)
Solution:
The stage where morphology of chromosome is best studied their spindle fibers attach to kinetochores.
Spindle fibres attach to kinetochores of chromosomes during metaphase.

(74) **Answer :** (4)
Solution:
Presence of cell wall as a unique feature of plant cell was reported by Theodore Schwann.
Theodore Schwann was a British zoologist.

(75) **Answer :** (3)
Solution:
In cilia and flagella 9 peripheral doublets and 2 microtubules in the centre are found (9 + 2 arrangement).

(76) **Answer :** (2)
Solution:
Meiosis II is meant for separation of chromatids (already duplicated material) because it is equational division step of meiosis.
Before entering in meiosis II, during interkinesis DNA replication does not occur.

(77) **Answer :** (4)
Solution:
Leucoplasts, chloroplasts and chromoplasts are the different types of plastids. They all are double membrane bound structures.

(78) **Answer :** (2)
Solution:
Centrioles show 9 + 0 arrangement of microtubules.

(79) **Answer :** (3)
Solution:
In some prokaryotes like cyanobacteria, there are other membranous extensions into the cytoplasm called chromatophores which contain pigments. Reserve material in prokaryotic cells are stored in the cytoplasm in the form of inclusion bodies.

(80) **Answer :** (4)
Solution:
In museum, larger animals like birds and mammals are usually stuffed and preserved.

(81) **Answer :** (4)
Solution:
Plasmid confers some unique phenotypic character in bacteria.

(82) **Answer :** (4)
Solution:
Prophase follows the G_2 phase of interphase.
Complete disintegration of nuclear envelope marks the start of metaphase of mitosis.

(83) **Answer :** (3)

(84) **Answer :** (4)

Solution:
70S ribosomes are found in mitochondria as well as chloroplasts in eukaryotic cells.

(85) **Answer :** (2)
Hint:
Processing, packaging and transport of materials are the important functions of golgi apparatus.
Solution:
Step-1 : Lysosomes are formed by the process of packaging in the golgi apparatus.

(86) **Answer :** (4)
Solution:
In diakinesis, terminalisation of chiasmata occurs. Also during diakinesis, the chromosomes are fully condensed and the meiotic spindle is assembled.

(87) **Answer :** (1)
Solution:
Exchange of genetic material between two homologous chromosomes or crossing over occurs in pachytene of prophase I.

(88) **Answer :** (1)
Solution:
Acetabularia is unicellular eukaryotic green alga.

(89) **Answer :** (3)
Solution:
Centriole gives a cartwheel appearance due to the presence of radial spokes and peripheral fibrils.

(90) **Answer :** (2)
Solution:
Syncytium has multinucleate condition.
Failure of cytokinesis after karyokinesis leads to the formation of syncytium.

(91) **Answer :** (3)
Solution:
• Synaptonemal complex dissolves during diplotene.
• Due to this the x-shaped structure called chiasmata becomes clearly visible

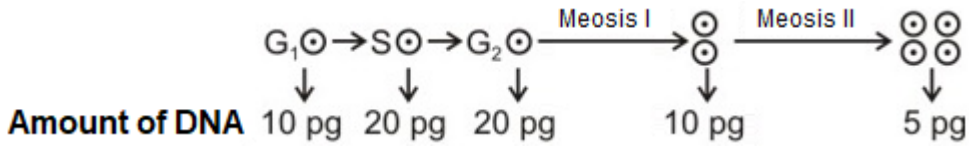
(92) **Answer :** (1)
Solution:
Condensation of chromosomes are initiated in prophase.

(93) **Answer :** (1)
Solution:
$G_1 = 2C = 40$ pg
After meiosis-II, the amount of DNA = 1C = 20 pg

(94) **Answer :** (3)
Solution:
In chromoplasts, fat soluble carotenoid pigments like carotene, xanthophylls and others are present.

(95) **Answer :** (2)
Solution:
DNA acts as genetic material in all cells except some viruses. Ribosome is the only cell organelle found in both prokaryotes and eukaryotes.
In prokaryotes, cell wall is not cellulosic, made up of peptidoglycan whereas in eukaryotes cellulose is the chief component of cell wall.

(96) **Answer :** (1)
Solution:



There would have 20 pg of DNA in a diploid cell at the end of S-phase if its meiotic product has 5 pg of DNA.

(97) **Answer :** (1)
Solution:
The correct sequential order of the events is as follow:
(a) Chromosomal synapsis – Zygotene
(b) Dissolution of synaptonemal complex – Diplotene
(c) Terminalisation of chiasmata – Diakinesis
(d) Univalent alignment at equator – Metaphase II

(98) **Answer :** (1)

Solution:
SER has no ribosomes at their surface and responsible for fat, oil and steroidal hormonal synthesis

(99) Answer : (4)
Solution:
Transport of ions into the vacuoles is against the concentration gradient, *i.e.* active.

(100) Answer : (3)
Solution:
Mesosomes are found in prokaryotic cells.