Paper : Introduction to Cell Biology and Biotechnology (UNIT 3-4)

Dr.K.R.Shah

1. According to fluid mosaic model, plasma membrane is composed of
(a) phospholipids and oligosaccharides

(b) phospholipids and hemicellulose

(c) phospholipids and integral proteins

(d) phospholipids, extrinsic proteins and intrinsic proteins.

Answer and Explanation:
1. (d): According to find mosaic model, plasma membrane is composed of phospholipids, extrinsic proteins and intrinsic proteins. Chemically, the plasma membrane is made up of 60% proteins and 40% lipids.
On the basis of their location, the membrane proteins can be put under two categories namely extrinsic (peripheral) and intrinsic (integral). The lipids of plasma membrane are of three types namely phospholipids, glycolipids and sterols.

2. Acetabularia used in Hammerling's nucleocytoplasmic experiments is
(a) unicellular fungus

(b) multicellular fungus

(c) unicellular uninucleate green algae

(d) unicellular multinucleate green algae.

Answer and Explanation:
2. (c): Hammerling's experiment with the single celled green algae, Acetabularia, showed that the nucleus of a cell contains the genetic information that directs cellullar development.
3. Organelles can be separated from cell homogenate through
(a) chromatography

(b) X-rays diffraction

(c) different centrifugation

(d) auto-radiography.

Answer and Explanation:
3. (c): Organelles can be separated from cell homogenate through differential centrifugation. The basic principle involved here is sedimentation of particles in a suspension by centrifugal force. In a centrifuge, the particles sediment at different rates when an accelerating force is subjected. The rate of sedimentation depends upon the size of the particles, its shape and density.
4. Plasmamembrane is made of
(a) proteins and carbohydrates

(b) proteins and lipids

(c) proteins, lipids and carbohydrates

(d) proteins, some nucleic acid and lipids.

Answer and Explanation:
4. (c): Plasma membrane is made up of protein, lipids and carbohydrates. Chemically, the plasma membrane is base up of 60% proteins and 40% lipids. The percentage of carbohydrates ranges from 1 -10 which are in the form of glycoproteins and glycolipids.
5. Polyribosomes are aggregates of
(a) ribosomes and rRNA

(b) only rRNA

(c) peroxisomes

(d) several ribosomes held together by string of rnRNA.

Answer and Explanation:
5. (d): Polyribosomes are aggregates of several ribosomes held together by string of mRNA. Polyribosomes consist of 4 – 8 ribosomes which are attached to a single strand of messenger RNA or mRNA. This mechanism helps in synthesis of several copies of the same protein.
6. Nucleoproteins are synthesised in
(a) nucleoplasm

(b) nuclear envelope

(c) nucleolus

(d) cytoplasm.

Answer and Explanation:
6. (d): Nucleoproteins are compounds present in cells of living organisms that consists of nucleic acids with proteins. Nucleoproteins are synthesized in cytoplasm. These are conjugated proteins. They is of two types – Deoxyribonucleoproteins and ribonucleoproteins.
7. A bivalent consists of
(a) two chromatids and one centromere

(b) two chromatids and two centromeres

(c) four chromatids and two centromeres

(d) four chromatids and four centromeres.

Answer and Explanation:
7. (c): A bivalent consist of four chromatids and two centromeres. Bivalent is a pair of homologous chromosome lying together in the zygotene stage of prophase I of first meiotic division.
8. Magnification of compound microscope is not connected with
(a) numerical aperture

(b) focal length of objective

(c) focal length of eye piece

(d) tube length.

Answer and Explanation:
8. (a): Magnification of compound microscope is not connected with numerical aperature. The magnifying power is represented by the symbol 'X'. The total magnification of a microscope is obtained by multiplying the objective magnification and ocular lens magnification e.g., if the magnifying power of an ocular lens is 1 OX and of the objective is 40X, then the total magnifying power of a microscope is 10 x 40 = 40)£.

9. The latest model for plasma membrane is

(a) lamellar model

(b) unit memorane model

(c) fluid mosaic model

(d) molecular lipid model.

Answer and Explanation:
9. (c): The latest model of plasmamembrane is Fluid Mosaic Model. It was discovered by Singer and Nicolson, 1972. The membrane is a continuous lipid bilayer having integral protein molecules. The two are so dispersed that they form a mosaic pattern. The membrane is semifluid in nature and hence the lipid molecules and intrinsic proteins move freely.

10. Hammerling's experiments of Acetabularia involved exchanging

(a) cytoplasm

(b) nucleus

(c) rhizoid and stalk

(d) gametes.

Answer and Explanation:
10. (c): Hammerling's experiments with the single celled green algae, Acetabularia,showed that the nucleus of a cell contains the genetic information that directs cellular development.
Each Acetabularia cell is composed of 3 segments, the foot or base which contains the nucleus, stalk and the cap. In his experiments, he grafted the stalk of one species of Acetabularia onto the foot of another species.

In all cases, the cap that eventually developed on the grafted cell matched the species of the foot rather than that of stalk. This experiment shows that the base is responsible for the type of cap that grows and nucleus directs cellular development.

11. Electron microscope has a high resolution power. This is due to

(a) Electromagnetic lenses

(b) Very low wavelength of electron beam

(c) Low wavelength of light source used

(d) High numerical aperture of glass lenses used.

Answer and Explanation:
11. (b): Electron microscope has a high resolution power. This is due to very low wavelength of electron beam (0.005 mu) of the electron beam used as light source. It is produced when a metal filament is heated in a vaccum tube at high temperature, i.e., 50,000 volts.

12. Resolution power is the ability to

(a) distinguish two close points

(b) distinguish two close objects

(c) distinguish amongst organelles

(d) magnify image.

Answer and Explanation:
12. (b): Resolution power is the ability to distinguish two close objects. It is the ability of a system to distinguish two close points as two separate points. Resolving power of microscope depends upon the numerical aperture of the objective lens system and its wavelength.
13. Fluid mosaic model of cell membrane was put forward by
(a) Danielli and Davson

(b) Singer and Nicolson

(c) Garner and Allard

(d) Watson and Crick.

Answer and Explanation:
13. (b): Fluid mosaic model was put forward by Singer and Nicolson (in 1972, 74). Lipids and intrinsic proteins form a mosaic pattern. The membrane is semi fluid in nature and hence the lipid molecules and intrinsic proteins move freely.
14. Ribosomes were discovered by
(a) Golgi

(c) De Robertis

(b) Porter

(d) Palade.

Answer and Explanation:
14. (d): Ribosomes are minute cellular, non-membranous particles having an average diameter of 23 mm (230 A^0).
In plant cells ribosomes were first of all observed by Robinson and Brown (1953) in bean roots. In animal cells, these were discovered by Palade (1955), hence are called Palade particles. Ribosomes form a part of fraction microsome, a term given by A, Claude (made of broken ER, ribosomes and Golgi bodies).

15. Cell wall shows
(a) complete permeability

(b) semipermeability

(c) differential permeability

(d) impermeability.

Answer and Explanation:
15. (a): Cell wall shows complete permeability because it helps in the transport of substances into and out of the cell. The main function of cell wall is to provide mechanical support.
16. Addition of new cell wall particles amongst the existing ones is
(a) deposition

(b) apposition

(c) intussusception

(d) aggregation.

Answer and Explanation:
16. (c): Addition of new cell wall particles amongst the existing one is intussusception. Growth of cell wall occurs by two methods – By intussusception and by opposition. By intussusception, the primary wall is stretched and materials of secondary wall are deposited. By opposition, materials of secondary wall are deposited in the form of thin layers.
17. Angstrom (A) is equal to
(a) 0.01 um

(b) 0.001 um

(c) 0.0001 um

(d) 0.00001 um

Answer and Explanation:
17. (c): An angstrom (symbol A) is a non-SI unit of length that is internationally recognized, equal to 0.1 nanometer (nm). It can be written in scientific notations as 1×10^{-10} m. It is used in expressing the size of atoms, length of chemical bonds etc. It is named after Anders Jonas Angstrom.
18. Ribosomes are the centre for
(a) respiration

(b) photosynthesis

(c) protein synthesis

(d) fat synthesis.

Answer and Explanation:
18. (c): Ribosomes are the centre for protein synthesis. Free ribosomes synthesize structural proteins, proteins normally found in microbodies, chloroplast and mitochondria and proteins destained to remain in cytosol such as enzymes of glycolysis or proteins of cytoskeleton. On the other hand, ribosomes attached on ER synthesize proteins for transport, integral or intrinsic proteins of membrane and proteins of certain organelles like Golgi complex, lysosomes and plant vacuoles.
19. Oxysomes of F_0 – F_1 particles occur on
(a) thyiakoids

(b) mitochondrial surface

(c) inner mitochondrial membrane

(d) chloroplast surface.

Answer and Explanation:
19. (c): Oxysomes of F_0 – F_1 particles occurs on inner mitochondrial membrane. Each particle is made up of base, stalk and head and is about 10 mm in length. The number of oxysomes per mitochondrion varies from 10^4-10^5. Chemically these are made up of phospholipid core and protein cortex. Oxysomes have ATP as enzyme molecules and therefore, responsible for ATP synthesis. These elementary particles are also called F_0 – F, particles by some workers. The base of these is called F_0 subunit and head is called F, subunit.

20. All plastids have similar structure because they can
(a) store starch, lipids and proteins

(b) get transformed from one type to another

(c) perform same function

(d) be present together.

Answer and Explanation:
20. (b): All plastids have similar structure because they can get transformed from one type to another. These are involved in the formation and storage of soluble and insoluble carbohydrates. Plastids are of three types namely – chloroplasts, leucoplasts and chromoplasts.
21. An outer covering membrane is absent over
(a) nucleolus

(b) lysosome

(c) mitochondrion

(d) plastid.

Answer and Explanation:
21. (a): An outer covering membrane is absent over nucleolus. Nucleolus is a dense, spherical, colloidal body which remains attached with nucleolar organizing chromosomes. It was discovered by Fontana (1781) and termed as nucleolus by Bowman (1840). The main function of nucleolus is the synthesis of ribosomal RNA and it is called store house of RNA. It plays important role in cell division also.
22. Which one is apparato reticolare?
(a) golgi apparatus

(b) endoplasmic reticulum

(c) microfilaments

(d) microtubules.

Answer and Explanation:
22. (a): Apparato reticolare are Golgi apparatus. The Golgi apparatus was named after Camillo Golgi (1906) who discovered this cell structure in nerve cells (1898) and assigned it the role of a cell organelle. Inspired by its appearance, Golgi named this cell structure the inner reticular apparatus (apparato reticolare inferno).
23. Experiments on Acetabularia by Hammeriing proved the role of
(a) cytoplasm in controlling differentiation

(b) nucleus in heredity

(c) chromosomes in heredity

(d) nucleo-cytoplasmic ratio.

Answer and Explanation:
23. (b): Acetabularia used in Hammerling's nucleocytoplasmic experiment is unicellular uninucleate green algae. Hammerling's experiment of Acetabularia involved exchanging rhizoid and stalk. Presence of hereditary information in the nucleous was proved by the work of Hammerling on single called alga Acetabularia.
24. All types of plastids possess essentially the same structure because they

(a) Perform the same function

(b) Store food materials like starch, fat and protein

(c) Occur in aerial parts

(d) Can transform from one form to another.

Answer and Explanation:
24. (d): All the plastids have a common origin and one type of plastid can change into another. Plastids are of 2 main types' lencoplasts and chromoplasts. The leucoplasts are colourless and occur in the cells not exposed to sunlight. The chromoplasts are coloured occur in the cells exposed to sunlight.
25. Binding of specific protein on regulatory DNA sequency can be studied by means of
(a) ultra centrifugation

(b) electron microscope

(c) light microscope

(d) X-rays crystallography.

Answer and Explanation:
25. (d): X-rays crystallography is a technique which is used to study of binding protein on regulatory DNA sequence. In this technique, X-rays pass through a crystal of a substance and form a diffraction pattern. With the help of this technique, the arrangement of atoms in the molecular structure of enzymes, proteins, DNA, etc. can be studied. Wilkins, Watson and Crick used this technique to determine the molecular configuration of double helix of DNA.
26. Names of Schleiden and Schwann are associated with
(a) protoplasm as the physical basis of life

(b) cell theory

(c) theory of cell lineage

(d) nucleus functions as control centre of cell.

Answer and Explanation:
26. (b): Names of Schleiden and Schwann are associated with cell theory in 1839. The concept that "All living organisms are composed of cell" is known as cell theory.
27. Which is correct about cell theory in view of current status of our knowledge about cell structure?
(a) it needs modification due to discovery of subcellular structures like chloroplasts and mitochondria

(b) modified cell theory means that all living being are composed of ceils capable of reproducing

(c) cell theory does not hold good because all living beings (e.g., viruses) do not have cellular organisation

(d) cell theory means that all living objects consists of celis whether or not capable of reproducing.

Answer and Explanation:
27. (c): Cell theory does not hold good because all living beings (e.g., viruses) do not have cellular organisation. Viruses are exceptions to the cell theory as they are obligate parasites (subcellular in nature). Paramecium, Rhizopus, Vaucheria are some examples which may or may not be exceptions to the theory.
28. In salivary gland chromosomes/polytene chromosomes, pairing is
(a) absent

(b) occasional

(c) formed between nonhomologous chromosomes

(d) formed between homologous chromosomes.

Answer and Explanation:
28. (d): In salivary gland chromosomes/polytene chromosomes, pairing is formed between homologous chromosomes. A characteristics feature of these chromosomes is that somatic pairing occurs in them and hence their number appears half of normal somatic cells.
29. Cell recognition and adhesion occur due to biochemicals of cell membranes named
(a) proteins

(b) lipids

(c) proteins and lipids

(d) glycoproteins and glycolipids.

Answer and Explanation:
29. (d): Cell recognition and adhesion occur due to biochemicals of cell membranes named glycoproteins and glycolipids. These are formed due to small carbohydrate molecules present on lipids and extrinsic proteins.
30. Golgi apparatus is absent in
(a) higher plants

(b) yeast

(c) bacteria and Blue-green algae

(d) none.

Answer and Explanation:
30. (e): Golgi apparatus is absent in bacteria and blue green algae. Golgi bodies are absent in prokaryotic cells and present in eukaryotic cells except in male gametes of bryophytes and pteridophytes, mammalian RBCs, sieve tubes of plants and in cells of fungi.
31. Membranous bag with hydrolytic enzymes which is used for controlling intracellular digestion of macro-molecules is
(a) endoplasmic reticulum

(b) nucleosome

(c) lysosome

(d) phagosome.

Answer and Explanation:
31. (c): Membranous bag with hydrolytic enzymes which is used for controlling intracellular digestion of macromolecule is lysosome. Lysosomes digest the substances (proteins, fats etc.) present inside the cell. This is done during starvation and thus nourishment is provided by lysosomes. Lysosomes are formed from Golgi apparatus and contain some 40 types of acid hydrolaseis.
32. In plant cells, peroxisomes are associated with
(a) photorespiration

(b) phototropism

(c) photoperiodism

(d) photosynthesis.

Answer and Explanation:
32. (a): In plant cells, peroxisomes are associated with photorespiration. Peroxisomes are found only in C_3 plants where a wasteful phenomenon of photorespiration occurs. The other organelles associated with this process are chloroplast and mitochondria. Peroxisomes are also reported in animal cells, i.e., liver and kidney cells. The peroxisome contains several enzymes such as amino transferse, glycolate oxidase, glyoxylate reductase, peroxidase and catalase etc.
33. Balbiani rings (puffs) are sites of
(a) DNA replication

(b) RNA and protein synthesis

(c) synthesis of polysaccharides

(d) synthesis of lipids.

Answer and Explanation:
33. (b): Balbiani rings (puffs) are site of RNA and protein synthesis. These chromosomes show distinct dark and light bands. Euchromatin is present in dark bands and heterochromatin is present in light bands. These bands help in mapping of chromosomes in cytogenetic studies. These chromosomes form puffs or loops (in region of dark bands) which are called Balbiani puffs or Balbiani rings where synthesis of mRNA occurs.
34. Active and passive transports across cell membrane differ in
(a) passive transport is nonselective

(b) passive transport is along the concentration gradient while active transport is due to metabolic energy

(c) active transport is more rapid

(d) passive transport is confined to anions while active transport in confined to cations.

Answer and Explanation:
34. (b): Active and passive transports across cell membrane differ in passive transport is due to metabolic energy. There is always expenditure of energy in active transport.
35. Besides giving out secretory vesicles, the Golgi apparatus is also concerned with the formation of
(a) lysosomes

(b) plastids

(c) grana of chloroplasts

(d) cell plates after cell division in plants.

Answer and Explanation:
35. (a): The Golgi apparatus is present in all eukaryotic cells. It is specially extensive in the secretory cells. It is a central stack (pile) of parallel, flattened, intercommunicating sacs or cisternae and many peripheral tubules and vesicles.
The two poles of a Golgi apparatus are called cis face and Trans face, which act respectively as the receiving and shipping departments. The vesicles lie near the ends and concave surface of the Golgi complex.

They are pinched off from the tubules of the cisternae. They are of two types: smooth or secretory vesicles, which have a smooth surface and contain secretions of the cell; and coated vesicles that have rough surface

and elaborate membrane proteins. They carry materials to or from the cisternae. The Golgi complex gives rise to primary lysosomes by budding from the Trans face of cisternae.

36. The inner membrane of the mitochondria is, usually, highly convoluted forming a series of infoldings known as
(a) thylakoids

(b) lamellae

(c) cristae

(d) grana.

Answer and Explanation:
36. (c): The inner membrane of the mitochondria is infolded variously to form involutions called cristae. The cristae extend inward to varying degrees and may fuse with those from the opposite side, dividing the mitochondrion into compartments. The cristae are arranged in characteristic ways in different cells.
They may be simple or branched, straight or zigzag, lamellar or tubular. The cristae have in them a narrow intracristal space. It is continuous with the intermembrane space. They greatly increase the inner surface area of the mitochondria to hold a variety of enzymes.

37. Which one of the following organelles is located near the nucleus and contains a collection of flattened membrane bound cisternae?
(a) nucleolus

(b) mitochondrion

(c) centriole

(d) golgi apparatus.

Answer and Explanation:
37. (d): Golgi apparatus is a stack of parallel, flattened, intercommunicating sacs or cisternae and many peripheral tubules and vesicles. The cisternae vary in number from 3 to 7 in most animal cells and from 10 to 20 in plant cells.
They are usually equally spaced in the pile, separated from each other by thin layers of intercisternal cytoplasm. The latter may contain a layer of parallel fibres, called intercisternal elements that support the cisternae. The cisternae are free of ribosomes and have swollen ends. They look like the smooth endoplasmic reticulum.

38. Centromere is required for
(a) replication of DNA

(b) chromosome segregation

(c) poleward movement of chromosomes

(d) cytoplasmic cleavage.

Answer and Explanation:
38. (c): Centromere is a part of a chromosome that attaches to the spindle during cell division. The position of the centromere is a distinguishing feature of individual chromosomes: a chromosome with the centromere at its centre is described as metacentric; one with the centromere towards one end is acrocentric; and a

chromosome with the centromere at either end is telocentric. The centromere usually appears as a constriction when chromosomes contract during cell division.
During anaphase, the centromere of each chromosome divides into two, so that each chromatid comes to have its own centromere. The two chromatids now start repelling each other and separate completely to become daughter chromosomes. The daughter chromosomes move towards the poles of spindle along the path of their chromosome fibres. In anaphasic movement of chromosomes, the centromeres lead the path while the limbs trail behind.

39. In mitochondria, cristae act as sites for
(a) protein synthesis

(b) phosphorylation of flavoproteins

(c) breakdown of inacromolecules

(d) oxidation-reduction reaction.

Answer and Explanation:
39. (d): Respiratory chain is located in the inner membrane (cristae) of mitochondria. It consists of a series of proteins containing oxidation-reduction groups. Chemical treatment of the mitochondrial membrane results in the isolation of five complexes which have been designated as complexes I, II, III, IV and V.
40. Which of the following organelles contain enzymes that have digestive action?
(a) ribosomes

(b) polysomes

(c) plastids

(d) lysosomes.

Answer and Explanation:
40. (d): A lysosome is a tiny sac bounded by a single unit membrane of lipoprotein. It contains a dense, finely granular fluid. The latter consists of glycoprotein hydrolytic (digestive) enzymes called acid hydrolases. These include proteases, lipases, nucleases, glycosidases, sulphatases, acid phosphatases, etc.
However, all the enzymes do not occur in the same lysosome. There are different sets of enzymes in different lysosomes. The lysosome enzymes can break down all major biological macromolecules present in the cells or entering the cells from outside into their building block subunits by addition of water. The lysosome enzymes are active in acid medium, at about pH 5, hence their name.

41. The desmosomes are concerned with
(a) cell division

(b) cell adherence

(c) cytolysis

(d) cellular excretion.

Answer and Explanation:
41. (b): In desmosomes circular patches of cell membranes are held together by interaction of proteins that extend through each membrane into the space between cells. The cell membrane has on the inner side a dense plate of protein for mechanical support and bears fine filaments, the tonofibrils, radiating into the cell. The desmosomes act as “spot welds” and keep the cells firmly together.
42. The prokaryotic flagella possess

(a) helically arranged protein molecule

(b) “9 + 2″ membrane enclosed structure

(c) unit membrane enclosed fibre

(d) protein membrane enclosed fibre.

Answer and Explanation:
42. (a): Prokaryotic flagellum is not surrounded by any membrane. It consists of a single fhread. The thread is made of numerous identical spherical protein sub-units called, flagellin. Each subunit is about 40 A in diameters. The flagellin sub-units are arranged in helical spirals and form a hollow cylinder. Each flagellum is about 120-150 A thick.
43. Colchicine is an inhibitory chemical, which
(a) stops the functioning of centriole

(b) prevents attaching of centromeres with rays

(c) prevents the spindle formation in mitosis

(d) prevents the formation of equatorial plane.

Answer and Explanation:
43. (c): Colchicine is an alkaloid derived from the autumn crocus, Colchicum autumnale. It inhibits spindle formation in cells during mitosis so that chromosomes cannot separate during anaphase, thus inducing multiple sets of chromosomes. Colchicine is used in genetics, cytology, and plant breeding research and also in cancer therapy to inhibit cell division.
44. Lysosomes are rich in
(a) nucleic acids

(b) hydrolytic enzymes

(c) carbohydrates

(d) hormones.

Answer and Explanation:
44. (b): Refer answer 40.
45. Protein synthesis in an animal cell takes place
(a) in the cytoplasm as well as endoplasmic reticulum

(b) only on ribose attached to nucleon

(c) only in the cytoplasm

(d) in the nucleolus as well as in the cytoplasm.

Answer and Explanation:
45. (d): Protein synthesis in an animal cell, takes place in the nucleolus as well as in the cytoplasm. Main part of protein synthesis (transcription and translation) occurs in nucleolus. Chain elongation occurs in cytoplasm.
46. The mechanism of ATP formation both in chloroplast and mitochondria is explained by
(a) chemiosmotic theory

(b) Munch's hypothesis (mass flow model)

(c) relay pump theory of Godlewski

(d) Cholodny-Wont's model.

Answer and Explanation:
46. (a): Chemiosmotic coupling hypothesis is the most widely accepted explanation for oxidative phosphorylation in mitochondria and photophos- phorylation in thylakoid membranes. Mitchell proposed the idea of chemiosmotic coupling.
He suggested that a concentration gradient of protons is established across the mitochondrial membrane because there is an accumulation of hydrogen ions on one side of the mitochondrial membrane. The proton accumulation is necessary for energy transfer to the endergonic ADP phosphorylation process.

47. Which of the following structures will not be common to mitotic cell of a higher plant?
(a) centriole

(b) spindle fibre

(c) cell plate

(d) centromere.

Answer and Explanation:
47. (a): The centrioles occur in nearly all animal cells and in motile plant cells, such as zoospores of algae, sperm cells of ferns, and motile algae. They are absent is amoebae, prokaryotic cells, higher gymnosperms and all angiosperms. An interphase (undividing) cell has a pair of centrioles (diplosome) usually near the nucleus.
They lie in a small mass of specialized, distinctly staining cytoplasm that lacks other cell organelles. The centrioles and the centrosphere are together referred to as centrosome.

Before cell division, the centrioles duplicate so that a dividing cell has a pair of centrioles at each pole of the spindle. Spindle fibre, cell plate and centromere are present in all plant cells.

48. The proteins are synthesized at
(a) centrosomes

(b) golgi bodies

(c) ribosomes

(d) mitochondria.

Answer and Explanation:
48. (c): The ribosomes provide space for the synthesis of proteins in the cell. Hence, they are known as the "protein factories" of the cell. The ribosomes bound to the membranes generally synthesize proteins for export as secretions by exocytosis, or for incorporation into membranes, or for inclusion into lysosomes.
The free ribosomes generally produce enzymic proteins for use in the cell itself.

49. Which of the following organelles has single membrane?
(a) mitochondria

(b) spherosomes

(c) nucleus

(d) cell wall.

Answer and Explanation:
49. (b): The spherosomes are, spherical bodies, about 0.5-1 nm wide and enclosed by a single unit membrane. They contain granular contents rich in lipids but also have some proteins. They occur in most plant cells but are abundant in the endosperm cells of oil seeds. Spherosomes, arise from the endoplasmic reticulum.

50. Which cell organelle is concerned with glycosylation of protein?
(a) ribosome

(b) peroxisome

(c) endoplasmic reticulum

(d) mitochondria.

50. (c): Glycolysation of protein means linking of sugars to proteins which starts in rough endoplasmic reticulum and completed in golgi complex.
51. Function of telomeres in nucleus is
(a) poleward movement

(b) to initiate the RNA synthesis

(c) to seal the ends of chromosome

(d) to recognise the homologous chromosome.

Answer and Explanation:
51. (a): Inside the cell nucleus, all our genetic information is located on twisted, double stranded molecules of DNA which are packaged into chromosomes. At the end of these chromosomes are telomeres, zones of repeated chains of DNA.
The telomere is like a cellular clock, because every time a cell divides, the telomere shortens. After a cell has grown and divided a few dozen times, the telomeres turn on an alarm system that prevents further division.

The DNA in the chromosome acts like a sort of instruction manual for the cell. Genetic information is transcribed into segments of RNA that then go out into the cell and carries out a variety of tasks. It was thought that telomeres were “silent” — that their DNA was not transcribed into strands of RNA. The researchers have turned this theory on its head by discovering telomeric RNA and showing that this RNA is transcribed from DNA on the telomere.

52. Which of the following ribosomes are engaged in protein synthesis in animal cell?
(a) ribosomes which occur on nuclear membrane and E.R.

(b) ribosomes of only cytosol

(c) ribosomes of only nucleolus and cytosol

(d) ribosomes of only mitochondria and cytosol.

Answer and Explanation:

52. (a): Ribosomes present in nuclear membrane and endoplasmic reticulum take part in protein synthesis. Two or more ribosomes simultaneously engaged in protein synthesis on the same mRNA strand forming polyribosomes. The ribosome functions as a template, bringing together different components required for protein synthesis.

53. Lysosome contains

(a) oxidative enzymes

(b) hydrolytic enzymes

(c) reductive enzymes

(d) anabolic enzymes.

Answer and Explanation:

53. (b): Refer answer 40.

54. When water moves through a semipermeable membrane then which of the following pressure develops?

(a) osmotic pressure

(b) suction pressure

(c) turgor pressure

(d) wall pressure.

Answer and Explanation:

54. (a): The pressure required to stop the flow of pure water into a solution across a semi permeable membrane is a characteristic of the solution, and is called the osmotic pressure. Thus water will move from a region of low osmotic pressure to a region of high osmotic pressure. Turgor pressure is the hydrostatic pressure set up within a cell by the water present acting against the elasticity of the wall Suction pressure when referred to a cell, is the force which is available for taking in water.

55. Proteinaceous pigment which controls the activities concerned with light is

(a) phytochrome

(b) chlorophyll

(c) anthocyanin

(d) carotenoids.

Answer and Explanation:

55. (a): Phytochrome is a plant pigment that can detect the presence or absence of light and is involved in regulating many processes that are linked to day length (photoperiod), such as seed germination and initiation of flowering.

It consists of a light-detecting portion, called a chromophore, linked to a small protein and exists in two intercovertible forms with different physical properties, particularly in the ability to bind to membranes. Chlorophyll occurs in all land plants and is responsible for their green colour. Chlorophyll molecules are the principal sites of light absorption in the light-dependent reactions of photosynthesis.

Anthocyanin occurs in the cell vacuoles of various plant organs and is responsible for many of the blue, red and purple colours in plants.

Carotenoids are responsible for the characteristic colour of many plant organs, such as ripe tomatoes, carrots, and autumn leaves. They also occur in certain algae and other photosynthesizing organisms (such as

phototrophic bacteria), in which they function as accessory pigments in the light-dependent reaction of photosynthesis.

56. Microtubules are absent in
(a) mitochondria

(b) flagella

(c) spindle fibres

(d) centrioles.

Answer and Explanation:
56. (a): Microtubule is a microscopic tubular structure, with an external diameter of 24 nm and of variable length, found in a wide range of eukaryotic cells Microtubules are composed of numerous subunits of the globular protein tubulin and occur singly or in pairs, triplets, or bundles. Microtubules help cells to maintain their shape.
They also occur in cilia and eukaryotic flagella and the centrioles and form the spindle during nuclear division. A further role is in the intracellular transport of materials and movement of organelles.

57. Element necessary for the middle lamella is
(a) Ca

(b) Zn

(c) K

(d) Cu.

Answer and Explanation:
57. (a): Middle lamella is the first formed layer, present between the two adjacent cells. It is situated outside the primary cell wall. It is made up of calcium and magnesium pectate.
58. In fluid mosaic model of plasma membrane
(a) upper layer is non-polar and hydrophilic

(b) upper layer is polar and hydrophobic

(c) phospholipids form a bimolecular layer in middle part

(d) proteins form a middle layer.

Answer and Explanation:
58. (c): In early 1972, S. Jonathan Singer and Garth Nicolson proposed fluid mosaic model for the membrane structure. As per the model, the cell membrane consists of a highly viscous, fluid matrix of 2 layers of phopholipid molecules, having globular proteins associated with them.
The lipids and proteins vary from one type of membrane to another. The cell membrane also has oligosaccharides on the exposed surface. A good amount of cholesterol is also present in the cell membrane of animal cells.

The phospholipids molecules are amphipathic, i.e., have both hydrophilic and hydrophobic regions. They have their polar, hydrophilic heads directed outward and nonpolar, hydrophobic tails pointing inward.

59. Ribosomes are produced in
(a) nucleolus

(b) cytoplasm

(c) mitochondria

(d) golgi body.

Answer and Explanation:
59. (a): Nucleolus synthesizes and stores RNA. The ribosomal proteins are synthesized in the cytoplasm and shift to the nucleolus for the formation of ribosomal subunits by complexing with rRNA.
60. Cellular totipotency is demonstrated by
(a) only gymnosperm cells

(b) all plant cells

(c) all eukaryotic cells

(d) only bacterial cells

Answer and Explanation:
60. (b): Totipotency is the ability of a living somatic plant cell to develop into a complete plant. It was first demonstrated by Steward et. al (,1964) using phloem cells of carrot. This technique is now used for multiplying rare and endangered plants through micro-propagations. This technique is widely used for multiplying plants e.g. – Chrysanthemum, Dioscoreafloribunda, Coleus, Crotons, carnation plants etc.
61. In chloroplasts, chlorophyll is present in the
(a) outer membrane

(b) inner membrane

(c) thylakoids

(d) stroma.

Answer and Explanation:
61. (c): A chloroplast is a vesicle bounded by an envelope of two unit membranes and filled with a fluid matrix called stroma. The lamellae, after separation from the inner membrane, usually take the form of closed, flattened, ovoid sacs, the thylakoids, which lie closely packed in piles, the grana.
The thylakoid membrane contains photosynthetic pigments namely, chlorophyll a, chlorophyll b, carotenoids (carotene, xanthophylls) and plastoquinone. The thylakoid membranes also contain coupling factors that bring about ATP synthesis.

62. The telomeres of eukaryotic chromosomes consist of short sequences of
(a) thymine rich repeats

(b) cytosine rich repeats

(c) adenine rich repeats

(d) guanine rich repeats.

Answer and Explanation:
62. (d): Telomeres are highly conserved element throughout the eukaryotes both in structure and function. Telomeric DNA has been shown to consist of simple randomly repeated sequences, characterised by clusters of G residues in one strand and C residues in other strand. A short sequence of (12-16 nucleotides in length) of G rich strand as overhang is another feature of telomere.

63. The main organelle involved in modification and outing of newly synthesized proteins to their destinations is
(a) chloroplast

(b) mitochondria

(c) lysosome

(d) endoplasmic reticulum.

Answer and Explanation:
63. (d): The proteins formed on ribosomes pass into the ER lumen where they are modified. Then the modified proteins move on into the transitional area, where the ER buds off membranous sacs, the transport vesicles, carrying the proteins to the Golgi apparatus.
Here, they are further processed and packaged into secretory vesicles for export by exocytosis at the plasma membrane. Chloroplasts are specialized to perform photosynthesis. Mitochondrion is the power house of the cell. Lysosomes contain hydrolytic enzymes.

64. Chemiosmotic theory of ATP synthesis in the chloroplasts and mitochondria is based on
(a) membrane potential

(b) accumulation of Na ions

(c) accumulation of K ions

(d) proton gradient.

Answer and Explanation:
64. (d): Refer answer 46.
65. Centromere is required for
(a) movement of chromosomes towards poles

(b) cytoplasmic cleavage

(c) crossing over

(d) transcription.

Answer and Explanation:
65. (a): Centromere is the point at which the two chromatids of a chromosome are held together. During movement of chromosomes, the spindle fibres (on which the chromatids move) are attached to the centromere. Crossing over involves physical exchange of genetic material between non-sister chromatids of homologous chromosomes.
Cytoplasmic cleavage is the division of cytoplasm. Transcription is the process in which the genetic information of DNA is transferred to mRNA as the first step in protein synthesis.

66. According to widely accepted "fluid mosaic model" cell membranes are semi-fluid, where lipids and integral proteins can diffuse randomly. In recent years, this model has been modified in several respects. In this regard, which of the following statements is incorrect?
(a) proteins in cell membranes can travel within the lipid bilayer.

(b) proteins can also undergo flip-flop movements in the lipid bilayer.

(c) proteins can remain confined within certain domains of the membrane.

(d) many proteins remain completely embedded within the lipid bilayer.

Answer and Explanation:
66. (b): There are many different proteins embedded in the membrane. Except for flip flop movements rest occurs. Option (a) is simply demonstrated when carrier proteins bind with and transport specific molecules into or out of the cell and cell organelles. Option (c) type of proteins can be enzymes which are confined to certain domains and option (d) types are non-transmenbrane proteins.
67. A student wishes to study the cell structure under a light microscope having 10X eyepiece and 45X objective. He should illuminate the object by which one of the following colours of light so as to get the best possible resolution?
(a) blue

(b) green

(c) yellow

(d) red.

Answer and Explanation:
67. (a): Resolution of microscope is inversely proportional to wavelength of light used. Out of four options given, blue light has minimum wavelength and hence maximum resolution.
68. Chlorophyll in chloroplasts is located in
(a) grana

(b) pyrenoid

(c) stroma

(d) both grana and stroma.

Answer and Explanation:
68. (a): Refer answer 61.
69. A major breakthrough in the studies of cells came with the development of electron microscope. This is because
(a) the electron microscope is more powerful than the light microscope as it uses a beam of electrons which has wavelength much longer than that of photons

(b) the resolving power of the electron microscope is much higher than that of the light microscope

(c) the resolving power of the electron microscope is 200 – 350 nm as compared to 0.1 – 0.2 nm for the light microscope

(d) electron beam can pass through thick materials, whereas light microscopy requires thin sections

Answer and Explanation:
69. (b): Microscopes are used for studying cellular structures. They are used to magnify small objects. In electron microscopes, a high energy beam of electrons is focused through electromagnetic lenses. It can magnify very small details with high resolving power. The increased resolution results from the shorter wavelength of the electron beam.
70. Which of the following statements regarding cilia is not correct?
(a) cilia contain an outer ring of nine doublet microtubules surrounding two singlet microtubules

(b) the organized beating of cilia is controlled by fluxes of Ca^{2+} across the membrane
(c) cilia are hair-like cellular appendages

(d) microtubules of cilia are composed of tubulin

Answer and Explanation:
70. (b): Cilia are fine hair like vibratile, cytoplasmic processes borne by certain cell types. Their movement either propels the organism or moves the medium past a fixed cell. The cilia are enclosed by a unit membrane which is an extension of the plasma membrane of the cell. Within the membrane, is a fluid matrix having a supporting axial shaft, or axoneme.
The axoneme is composed of eleven microtubules. Two microtubules are single and lie at the centre with a gap in between. They are called central singlets. The remaining nine microtubules are double and lie in a ring around the central microtubules. The two microtubules forming a doublet are named A and B subtubules.

The microtubules single as well as double, are composed of the globular units of the protein tubulin. The arms of A microtubules contain a protein dynein. The latter is ATPase enzyme which catalyzes hydrolysis of ATP to ADP, and transfers the free energy released direct to ciliary work.

71. Which of the following statements regarding mitochondrial membrane is not correct?
(a) the outer membrane resembles a sieve

(b) the outer membrane is permeable to all kinds of molecules

(c) the enzymes of the electron transfer chain are embedded in the outer membrane

(d) the inner membrane is highly convoluted forming a series of infoldings

71. (c): The outer membrane of mitochondrion is smooth, freely permeable to most small molecules, contains fewer enzymes and is poor in proteins. It has porin proteins which form channels for the passage of molecules through it. It allows uptake of substrates and release of ATP. The inner membrane is semipermeable and regulates the passage of materials into and out of the mitochondrion.
It is rich in enzymes and carrier proteins (permeases). It is usually produced into numerous infolds called cristae (singular crista). It bears – minute regularly spaced lollipop-shaped particles known as oxysomes. The rest of the inner membrane contains the electron carrier molecules of the electron transport chain.

72. Biological organisation starts with
(a) cellular level

(b) organismic level

(c) atomic level

(d) submicroscopic molecular level.

Answer and Explanation:
72. (d): Molecular assemblies are large organised sets of molecular units that make up parts of organelles. For example one common macromolecular assembly is the microtubule which is important in forming structure in the cell related to maintaining the cell structure or related to cell movement. The cell (plasma) membrane that surrounds many organelles and the cell is a highly organised molecular assembly.
73. Select the wrong statement from the following.
(a) both chloroplasts and mitochondria have an internal compartment, the thylakoid space bounded by the thylakoid membrane

(b) both chloroplasts and mitochondria contain DNA

(c) the chloroplasts are generally much larger than mitochondria

(d) both chloroplasts and mitochondria contain an inner and an outer membrane.

Answer and Explanation:
73. (a): Both chloroplasts and mitochondria contain DNA and are double membrane bound organelles having an inner membrane and outer membrane. Mitochondria occur in cytoplasm of both plants and animal cells. A mitochondria contains two chambers. The inner membrane forms mitochondrial cristae. Chloroplast is also a double membranous organelle but found only in plants. The membrane bound matrix of chloroplasts is stroma and inside the stroma thylakoids are present which form grana.
74. Which one of the following is not a constituent of cell membrane?
(a) glycolipids

(b) proline

(c) phospholipids

(d) cholesterol.

Answer and Explanation:
74. (b): Chemically a biomembrane consists of lipids (20-70%), proteins (20-70%), carbohydrates (1-5%) and water (20%). The important lipids of the membrane are phospholipids (some hundred types), sterols, (eg. cholesterol), glycolipids, sphingolipid (eg, sphingomyelin, cerebrosides). Protein can be fibrous or globular structural carrier, receptor or enzymatic. The lipid molecules are amphiatic or amphipathic, that is, they possess both polar hydrophilic (water loving) and non-polar hydrophobic (water repelling) ends.
The hydrophilic region is in the form of head while hydrophobic part contains two tails of fatty acids. It results in formation of a lipid bilayer. Most common lipid of the bilayer is phospholipids. Protein molecules also possess both polar and non-polar side chains. Usually their poly hydrophilic linkages are towards the outer side. The non-polar or hydrophobic linkage are either kept folded inside or used to establish connections with hydrophobic parts of the lipids.