DAY TWELVE

Unit Test 3
(Cell Structure and Function)

1 Of the following organelles associated with the endomembrane system, which group is primarily involved in synthesising molecules needed by the cell?
(a) Lysosome, vacuole and ribosome
(b) Ribosome, rough endoplasmic reticulum and smooth endoplasmic reticulum
(c) Vacuole, rough endoplasmic reticulum and smooth endoplasmic reticulum
(d) Smooth endoplasmic reticulum, ribosome and vacuole

2 The enzyme ribonuclease acts as a poison in
(a) prophase (b) metaphase (c) anaphase (d) telophase

3 The stage characterised by the appearance of recombination nodule is
(a) zygotene (b) pachytene (c) leptotene (d) diplotene

4 Fill in the blanks.
ADP + Pi → ATP is an ……..*A*…reaction.
ATP → ADP + Pi is an …*B*… reaction and the conversion of ADP + Pi to ATP …*C*…energy.
Here *A, B* and *C* refers to
(a) *A* – endergonic; *B* – exergonic; *C* – requires
(b) *A* – exergonic; *B* – endergonic; *C* – requires
(c) *A* – exergonic; *B* – endergonic; *C* – does not require
(d) *A* – exergonic; *B* – endergonic; *C* – releases

5 Amitosis occurs in
(a) meristematic cells
(b) spore mother cells
(c) prokaryotic cells
(d) Both (b) and (c)

6 The complex carbohydrate that is used in microbial culture medium is
(a) agar-agar (b) glucose
(c) micronutrients (d) coconut milk

7 A researcher made an interesting observation about a protein made by the rough endoplasmic reticulum and eventually used to build a cell's plasma membrane. The protein in the plasma membrane was actually slightly different from the protein made in the ER. The protein was probably altered in the
(a) Golgi apparatus
(b) mitochondria
(c) plasma membrane
(d) transport vesicles

8 Enzymes are basically made up of
(a) nucleic acids (b) proteins
(c) fats (d) vitamins

9 During diplotene, bivalents
(a) form synaptonemal complex
(b) shows bouquet arrangement
(c) repel each other
(d) attract each other

10 Enzyme inhibition caused by a product of enzyme catalysed reaction is
(a) feedback inhibition
(b) competitive inhibition
(c) metabolic antagonism
(d) non-competitive inhibition

11 How many mitotic divisions are required for a single cell to produce 128 cells?
(a) 32 (b) 28
(c) 14 (d) 7

12 Basal bodies are most closely associated with which one of the following cell components?
(a) Nucleus (b) Mitochondria
(c) Cilia (d) Central vacuole

13 The ash analysis of living tissues is performed to
(a) ascertain the molecular formula of organic compounds
(b) analyse the chemical composition of elements and compounds
(c) study the structure of retentate acid insoluble fraction
(d) to calculate the total number of biomolecules in a cell

14 Cupric ions of Benedict's solution can be reduced by ribose sugar due to the presence of
(a) free aldehydic group (b) free acidic group
(c) free phosphate ion (d) free ester group

15 Which process is most likely to be affected by colchicine?
(a) DNA replication (b) formation of cell plate
(c) spindle formation (d) All of these

16 The observation that chloroplasts and mitochondria contain their own DNA and synthesise some of the proteins that function in these organelles suggests that chloroplasts and mitochondria
(a) are produced by the nucleus of the cell
(b) must divide each time the cell containing them divides
(c) are part of the endomembrane system
(d) are involved in energy metabolism of the cell

17 The 'amphoteric' nature of amino acid is because
(a) α- carbon atom bears an amino group and an acidic group
(b) chemical activity of amino acids is unproductive
(c) The 'H' group present on the C-atom, inhibits the reactivity
(d) The 'H' group present on the C-atom, accelerates the reactivity

18 Predict the number of cells undergoing meiotic division, if the total number of spermatids produced are 32.
(a) 4 (b) 8
(c) 16 (d) 32

19 Which type of cell is most likely to have the most mitochondria?
(a) Muscle cells in the legs of a Marathon runner
(b) Photosynthetic cells in the leaves of a tree
(c) Bacterial cells that are growing on sugars
(d) Inactive yeast cells that are stored for future use

20 Which of the following is not a true statement about chloroplasts and mitochondria?
(a) Each contains a small amount of DNA
(b) Both are components of the endomembrane system
(c) Both are composed of two separate membranes
(d) Each organelle synthesises some of its own proteins

21 Chiasmata are first seen during
(a) zygotene (b) pachytene
(c) leptotene (d) diplotene

22 Microsomes as discrete entities
(a) are found in all living cells
(b) are found only in the nucleolus and revealed by electron microscope
(c) are found always attached to the outer surface of rough ER
(d) are not found in the intact cell but formed due to fragmentation of most of the cytoplasmic membranous components

23 The fibrous protein present in the spider's web is
(a) collagen (b) keratin (c) silk (d) myosin

24 Number of chromonemata in each chromosome during synapsis is
(a) 2 (b) 4 (c) 8 (d) 12

25 The wall-free protoplasts can be obtained by the enzymes
(a) cellulase and proteinase (b) cellulase and pectinase
(c) cellulase and lipase (d) cellulase and amylase

26 An unknown liquid collected from a food sample was added to a test tube containing water. The mixture was vigorously shaken to mix them well. After standing for a while, two distinct layers were formed in the test tube. To which class does the unknown liquid most likely belong?
(a) Proteins (b) Monosaccharides
(c) Esters (d) Lipids

27 The type of protein present in microtubule is
(a) collagen (b) myosin (c) tubulin (d) actin

28 Which one of the following organelles is unlikely to show enhanced abundance in the pancreatic cells that secrete large amount of digestive enzymes?
(a) Rough endoplasmic reticulum
(b) Free cytoplasmic ribosomes
(c) Golgi apparatus
(d) Transport vesicles

29 During cell division, condensation of chromatin results in
(a) increased heterochromatin content
(b) decreased differentiation of heterochromatin and euchromatin
(c) increased euchromatin content
(d) increased differentiation of heterochromatin and euchromatin

30 Consider a protein that is made in the rough endoplasmic reticulum. You observe that when the synthesis of the protein is completed, the protein is located in the ER membrane. Where else in the cell might this protein be found?
(a) In the aqueous interior of a lysosome functioning as a digestive enzyme
(b) In the cytoplasm, functioning as an enzyme in carbohydrate synthesis

(c) Embedded in the plasma membrane functioning in the transport of molecules into the cell
(d) In the internal space of the Golgi apparatus, being modified before the protein is excreted

31 Which cell division occurs during cleavage?
(a) Amitosis (b) Mitosis
(c) Closed mitosis (d) Meiosis

32 Which of the following sequences represents the order, in which a protein made in the rough endoplasmic reticulum might move through the endomembrane system?
(a) Golgi apparatus – Residual body
(b) Golgi apparatus – Vacuole
(c) Plasma membrane – Nuclear envelope
(d) Nuclear envelope – Lysosome

33 The 'R' group in the amino acid alanine consists of
(a) hydrogen (b) methyl group
(c) hydroxyl group (d) carboxyl group

34 A homopolymer has only one type of building block called monomer repeated 'n' number of times. A heteropolymer has more than one type of monomer. Proteins are heteropolymers made of amino acids while a nucleic acid like DNA or RNA is made of only 4 types of nucleotide monomers. Proteins are made of
(a) 20 types of monomer (b) 40 types of monomer
(c) 3 types of monomer (d) only one type of monomer

35 Glycerol upon esterification with fatty acids forms
(a) monoglyceride (b) diglyceride
(c) triglyceride (d) All of these

36 Proteins perform many physiological functions. For example, some function as enzymes. One of the following represents an additional function that some proteins discharge.
(a) Antibiotics
(b) Pigment conferring colour to skin
(c) Pigments making colours of flowers
(d) Hormones

37 Palmitic acid, a saturated fatty acid shows which of the following properties?
(a) Solid at room temperature and have double bonds in their carbon chains
(b) Solid at room temperature and do not have double bond in their carbon chain
(c) Occurs in most plant fats
(d) Have very low melting point

38 Chloroplasts and mitochondria are thought to be of prokaryotic origin. One piece of evidence that supports this hypothesis is that these organelles contain prokaryotic like ribosomes. These ribosomes are probably most similar to ribosomes found
(a) free in the cytoplasm of eukaryotes
(b) on the rough ER
(c) Both (a) and (b)
(d) in bacterial cells

39 A plant was grown in a test tube containing radioactive nucleotides, the molecules from which DNA is built. Later examination of dividing cells in the plant showed the majority of the radioactivity to be concentrated in the
(a) lysosome
(b) smooth endoplasmic reticulum
(c) central vacuole
(d) nucleus

40 Enzymes are biocatalysts. They catalyse biochemical reactions. In general, they reduce activation energy of reactions. Many physico-chemical processes are enzyme-mediated. Some examples of enzyme- mediated reactions are given below. Choose the incorrect entry.
(a) Dissolving CO_2 in water
(b) Untwining the two strands of DNA
(c) Hydrolysis of sucrose
(d) Formation of peptide bond

41 Which amongst the following biomacromolecules is a heteropolymer?
(a) Starch (b) Insulin (c) Protein (d) Cellulose

42 Essential amino acids are those
(a) that can be synthesised in our body
(b) essential for health
(c) has to be supplemented in our diet
(d) Both (b) and (c)

43 The enzymes and proteins required for the DNA replication are synthesised during
(a) G_0-phase (b) G_1-phase (c) G_2-phase (d) S- phase

44 You would expect a cell with an extensive Golgi apparatus to
(a) make a lot of ATP (b) secrete a lot of protein
(c) move rapidly (d) perform photosynthesis

45 The site of duplication of centriole in the animal cell is
(a) nucleus (b) cytoplasm
(c) nucleolus (d) mitochondria

46 The transient stage for the product formation in a reaction catalysed by an enzyme is
(a) enzyme substrate complex
(b) enzyme product complex
(c) enzyme inhibitor complex
(d) drastic increase in pH levels

47 Which of the following is not a characteristic of mitochondria?
(a) Mitochondria are involved in energy metabolism
(b) Mitochondria contain DNA and ribosomes
(c) Mitochondria are independent of the endomembrane system
(d) None of the above

48 Carcinogenic cells divide continuously as they lack
(a) leptotene phase (b) quiescent phase
(c) interphase (d) diakinesis

49 On hydrolysis, nucleoside does not yield
(a) phosphoric acid (b) pentose sugar
(c) purine (d) pyrimidine

50 Where would you expect to find proteins involved with movement of structures within a cell?
(a) Muscles (b) Cytoskeleton
(c) Cell wall (d) Plasma membrane

51 Vitamins remain undigested in the alimentary canal, yet form a very essential part of our diet because they
(a) act as apoenzyme (b) act as coenzyme
(c) act as holoenzyme (d) act as prosthetic group

52 Cytokinesis in plant cell does not occur by furrowing method due to the presence of solid, rigid cell wall on the outside of cell. They divide by cell plate method in which the cell plate represents
(a) cell wall (b) cell membrane
(c) middle lamella (d) nucleolus

53 Identify the incorrect option for ribosome?
(a) Made of two subunits
(b) Form polysome
(c) May attach to *m*RNA
(d) Have no role in protein synthesis

54 α-helix and β -pleated structures represent
(a) primary structure of proteins
(b) secondary structure of proteins
(c) tertiary structure of proteins
(d) quarternary structure of proteins

55 Phase of cell cycle when DNA polymerase is active
(a) G_1 (b) G_2
(c) S (d) M

56 Hyaluronic acid, which is a polysaccharide, plays a very significant role in living organism as
(a) it acts as a structural compound in cell wall
(b) it helps in coagulation
(c) it helps in lubrication of joints between bones
(d) it is used in tissue culture

57 Which of the following dyes is best suited for staining chromosomes?
(a) Basic Fuchsin (b) Safranin
(c) Methylene blue (d) Acetocarmine

58 Crossing over process, during which exchange of genetic material takes place occurs between
(a) sister chromatids of two homologous chromosomes
(b) non-sister chromatids of two homologous chromosomes
(c) recombinant homologous chromosomes
(d) sister chromatids of non-homologous chromosomes

59 Which of the following cellular processes or characteristics is not related to the cytoskeleton?
(a) Movement of the chromosomes during cell division
(b) Movement of cilia or flagella
(c) Contraction of muscle cells
(d) None of the above

60 Chromosome carrying centromeres at one end is
(a) metacentric
(b) submetacentric
(c) acrocentric
(d) telocentric

61 Enzyme amylase belongs to category
(a) oxidoreductase
(b) transferases
(c) hydrolases
(d) isomerases

62 The beaded appearance on the chromosomes is due to the presence of
(a) chromatids (b) chromomeres
(c) kinetochores (d) centromere

63 Synaptonemal complex, which is the site of chromosomal alignment and recombination was discovered by
(a) King (b) Moses
(c) Griffith (d) Balbiani

64 The cell that does not remain in permanent G_0 phase is
(a) nerve (b) heart
(c) fibroblast cell (d) skin cell

65 Which of the following is (are) most likely to be involved in the process of producing proteins for a chloroplast or mitochondrion, neither of which is part of the endomembrane system?
(a) Transport vesicles
(b) Free cytoplasmic ribosomes
(c) Golgi apparatus
(d) Rough endoplasmic reticulum

66 Glycogen is a homopolymer made up of
(a) glucose units
(b) galactose units
(c) ribose units
(d) amino acids

67 Which of the following categories best describes the function of the rough endoplasmic reticulum?
(a) Breakdown of complex foods
(b) Energy processing
(c) Manufacturing
(d) Structural support of cells

68 Which of the following organelles is involved in mitosis of animals but not in plants?
(a) Nucleus (b) Nucleolus
(c) Centriole (d) Cytoplasm

69 Mitosis results in increasing the number of cells within an organism. This process is called

(a) hyperplasia (b) polyembryony
(c) polyploidy (d) heterozygous

70 Which of the following are possible sites of protein synthesis in a typical eukaryotic cell?

(a) Cytoplasm
(b) Rough endoplasmic reticulum
(c) Mitochondria
(d) All of the above

71 Enzyme complex involved in alcoholic fermentation is

(a) urease (b) zymase
(c) diastase (d) dehydrogenase

72 In nucleic acids, purines and pyrimidines are

(a) always in equal proportion in DNA
(b) always in equal proportion in RNA
(c) their proportions may vary depending upon the stage of cell cycle
(d) their proportions may vary in prokaryotes only

73 Dye injected into a plant cell might be able to enter an adjacent cell through a

(a) tight junction
(b) microtubule
(c) cell wall
(d) plamodesmata

74 Select the correctly matched option.

(a) Meiosis – Strasburger
(b) Mitosis – Fleming
(c) Nucleolus – P Outlet
(d) Chromosome – Farmer and Moore

75 Glycocalyx (mucilage sheath) of a bacterial cell may occur in the form of a loose sheath called …*A*… or it may be thick and tough called …*B*… .

Choose the correct pair from the given options.

(a) *A* – capsule *B* – slime layer
(b) *A* – slime layer *B* – capsule
(c) *A* – mesosome *B* – capsule
(d) *A* – mesosome *B* – slime layer

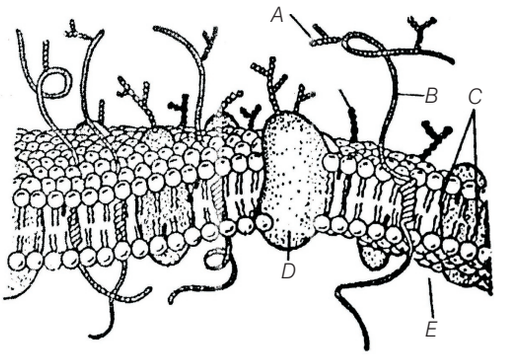
76 CdC_2 and CdK_2 are

(a) cofactors that are frequently conjugated with enzymes
(b) protein factories involved in synthesis of proteins and polypeptides
(c) enzymes that are involved in regulation of cell cycle
(d) proteins that function to block the cell cycle

77 The bond formed by dehydration at the bond formation site is

(a) peptide bond
(b) glycosidic bond
(c) phosphodiester bond
(d) ester bond

78 Identify the components labelled *A* to *E* in the given diagram of cell membrane from the list 1 to 7 given along with it.



Components

1. Sugar 2. Protein
3. Lipid bilayer 4. Integral protein
5. Cytoplasm 6. Cell wall
7. External protein

The correct components are

	A	B	C	D	E		A	B	C	D	E
(a)	1	2	3	4	5	(b)	2	1	3	4	5
(c)	1	2	3	6	4	(d)	1	2	3	7	5

79 Chemically enzymes are

(a) hydrocarbons (b) amino acids
(c) fats (d) proteins

80 'Apoptosis', which occurs in case of irreparable damage to the cell, is caused by,

(a) P 27 protein (b) P 53 protein
(c) cyclins (d) GLUT-4 proteins

81 The concept of cell lineage (cells arise from pre-existing cell only) was propounded by

(a) Purkinje (b) Virchow
(c) Swammerdam (d) Robert Hooke

82 Which one of the following four membranes is most likely to have a lipid composition that is distinct from the other three?

(a) Endoplasmic reticulum
(b) Mitochondrial outer membrane
(c) Lysosome membrane
(d) Golgi apparatus

83 The spindle fibres appear during early prophase and disappear in telophase because

(a) they are absorbed in the cytoplasm
(b) they are disintegrated and used up during the process of mitosis
(c) they are phagocyted by the cell to provide energy for the process
(d) absorbed by the condensed chromosomes

84 A protein that ultimately functions in the plasma membrane of a cell is most likely to have been synthesised
(a) on ribosomes of the nuclear envelope
(b) on free cytoplasmic ribosomes
(c) in the rough endoplasmic reticulum
(d) in the mitochondria

85 'Mesokaryon' is the term given to the nucleus of the,
(a) stage between interphase and karyokinesis
(b) stage between prophase-I and prophase-II
(c) stage between karyokinesis and cytokinesis
(d) dinoflagellates that possess condensed chromosomes in interphase

86 What is a tonoplast?
(a) Outer membrane of mitochondria
(b) Inner membrane of chloroplast
(c) Membrane boundary of the vacuole of plant cells
(d) Cell membrane of a plant cell

87 The condition when cell division is arrested at the metaphase of mitosis occurs when,
(a) nuclear envelope does not disintegrate
(b) spindle formation does not take place
(c) centrioles fail to migrate to the opposite poles
(d) Both (a) and (c)

88 Analyse the following pairs and identify the correct option given below.
I. Chromoplasts – Contain pigments other than chlorophyll.
II. Leucoplasts – Devoid of any pigments
III. Amyloplasts – Store proteins
IV. Aleuroplasts – Store oils and fats
V. Elaioplasts – Store carbohydrates
(a) II and III
(b) III and IV
(c) IV and V
(d) I and II

89 A cell which divides every minute can fill a 1 L beaker in 2 hours. How much time will it take to fill 500 mL beaker?
(a) 60 minutes
(b) 59 minutes
(c) 100 minutes
(d) 119 minutes

90 Optical isomerism is not shown by
(a) glycine
(b) alanine
(c) leucine
(d) histidine

ANSWERS

1 (b)	**2** (a)	**3** (b)	**4** (a)	**5** (c)	**6** (a)	**7** (a)	**8** (b)	**9** (c)	**10** (a)
11 (d)	**12** (c)	**13** (b)	**14** (a)	**15** (c)	**16** (b)	**17** (a)	**18** (b)	**19** (a)	**20** (b)
21 (d)	**22** (d)	**23** (c)	**24** (a)	**25** (b)	**26** (d)	**27** (c)	**28** (c)	**29** (b)	**30** (c)
31 (c)	**32** (b)	**33** (b)	**34** (a)	**35** (d)	**36** (d)	**37** (b)	**38** (d)	**39** (d)	**40** (a)
41 (c)	**42** (d)	**43** (b)	**44** (b)	**45** (b)	**46** (a)	**47** (d)	**48** (b)	**49** (b)	**50** (b)
51 (b)	**52** (c)	**53** (d)	**54** (b)	**55** (c)	**56** (c)	**57** (d)	**58** (b)	**59** (d)	**60** (d)
61 (b)	**62** (b)	**63** (b)	**64** (d)	**65** (b)	**66** (a)	**67** (c)	**68** (c)	**69** (a)	**70** (d)
71 (b)	**72** (a)	**73** (d)	**74** (b)	**75** (b)	**76** (c)	**77** (b)	**78** (a)	**79** (d)	**80** (b)
81 (b)	**82** (b)	**83** (a)	**84** (c)	**85** (d)	**86** (c)	**87** (b)	**88** (d)	**89** (d)	**90** (a)