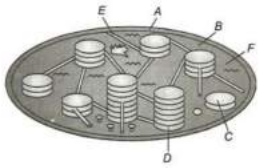
CELL THE UNIT OF LIFE

1. What are those structures that appear as 'beads-on-string' in the chromosomes when viewed under electron microscope?
   a) Nucleotides b) Nucleosomes c) Base pairs d) Genes
2. The two polynucleotide chains in DNA are
   a) Parallel b) Discontinuous c) Antiparallel d) Semi-conservative
3. Centrosome is not present in
   a) Cell of higher plants b) Cell of lower plants
   c) Cell of higher animals d) Cell of lower animals
4. Channel proteins are involved in
   a) Transport of enzymes b) Water transport
   c) Active transport of ions d) Passive transport of ions
5. Part of chromosome after secondary constriction is called
   a) Centriole b) Centromere c) Chromomere d) Satellite
6. Tubulin protein occurs in
   a) Digestive enzymes b) Rough endoplasmic reticulum
   c) Thylakoids d) Microtubules
7. Quantasomes are found in
   a) Mitochondria b) Chloroplast
   c) Lysosome d) Endoplasmic reticulum
8. In which one of the following would you expect to find glyoxysomes?
   a) Endosperm of wheat b) Endosperm of castor
   c) Palisade cells in leaf d) Root hairs
9. The non-membranous organelles are
   a) Centrioles b) Ribosomes c) Nucleolus d) All of these
10. Single stranded DNA is found in
    a) Polio viruses b) Rich dwarf virus c) TMV d) $\phi \times 174$
11. Ribosomes that occur exclusively in mitochondria is
    a) 70 S b) 55 S c) 30 S d) 50 S
12. Number of protofilament in microtubule is
    a) 13 b) 12 c) 5 d) 10
13. ...A... are granular structures first observed under electron microscope as dense particles by ...B... (1953). Here, A and B refer to
    a) A-Ribosomes; B-Perner b) A-Lysosomes; B-de Duve
    c) A-Peroxisomes; B-Flemming d) A-Ribosomes; B-George Palade
14. Middle lamella is present
    a) Inside the secondary wall b) Inside the primary wall
    c) Outside the primary wall d) In between secondary and tertiary walls
15. Rough endoplasmic reticulum differs from smooth walled endoplasmic reticulum due to the presence of
    a) DNA b) Nucleus c) Ribosomes d) Ergastic substance
16. A widely accepted, improved model of cell membrane is

a) Fluid mosaic model
b) Robertson's model
c) Danielli and Davson's model
d) Unit membrane model

17. Organelle important in spindle formation during nuclear division is
a) Golgi body
b) Chloroplast
c) Centriole
d) Mitochondrion

18. Identify A to F in the sectional view of a chloroplast showing the different parts



a) A-Inner membrane, B-Granum, C-Outer membrane, D-Stroma lamella, E-Stroma, F-Thylakoid
b) A-Outer membrane, B-Inner membrane, C-Granum, D-Thylakoid, E-Stroma lamella, F-Stroma
c) A-Thylakoid, B-Outer membrane, C-Stroma, D-Stroma lamella, E-Granum, F-Inner membrane
d) A-Outer membrane, B-Stroma, C-Inner membrane, D-Granum, E-Thylakoid, F-Stroma lamella

19. Consider the following statements and choose the correct one
a) Plant cells have centrioles which are absent in almost all animal cells
b) Ribosomes are the site of protein synthesis
c) The middle lamella is layer mainly of calcium carbonate which holds the different neighbouring cells together
d) In animal cells, steroidal hormones are synthesised by smooth endoplasmic reticulum

20. The backbone of RNA consists of which of the following sugar?
a) Deoxyribose
b) Ribose
c) Sucrose
d) Maltose

21. Chemiosmotic theory of ATP synthesis in the chloroplasts and mitochondria is based on
a) Proton gradient
b) Accumulation of K ions
c) Accumulation of Na ions
d) Membrane potential

22. Polysome is formed by
a) Several ribosomes attached to a single mRNA
b) Many ribosomes attached to a strand of endoplasmic reticulum
c) A ribosome with several subunits
d) Ribosomes attached to each other in a linear arrangement

23. In eukaryotic cell, plasmodesma is lined by plasma membrane. It encloses tubular extension of endoplasmic reticulum called
a) Microtubule
b) Microfilament
c) Tubule
d) Desmotubule

24. The factors which set the limit of cell size or volume are
I. nucleo-cytoplasmic or kern-plasma ratio
II. rate of metabolic activity
III. ability of oxygen and other materials to reach every part of the cell
IV. ability of waste products to pass to the outside
V. ratio of surface area to the volume of the cell
Identify the correct set of statements
a) III and IV
b) I and II
c) Only V
d) I, II, III and IV

25. The difference between rough endoplasmic reticulum and smooth endoplasmic reticulum is that rough endoplasmic recticulum
a) Does not contain ribosomes
b) Contains ribosomes
c) Does not transport proteins
d) Transport proteins

26. Cilia are
a) Short (5-10μm) hair-like narrow protoplasmic process
b) With sweeping or pendular movements
c) More numerous
d) All of the above

27. The enzyme DNA polymerase was discovered by
a) Kornberg b) Okazaki c) Watson and Crick d) Stahl and Meselson

28. Plant cells possess
a) Cell wall and central vacuole
b) Cell wall only
c) Cell wall and plastids
d) Cell wall, plastids and large central vacuole

29. Which of the following statements are correct?
I. Occurrence of different types of tissues, organs and organ system results in division of labour
II. A new cell always develops by the division of a pre-existing cells
III. Cells are totipotent
IV. Cell is the smallest unit, capable of independent existence and performing the essential functions of life
The correct option is
a) I, II and III b) I, III and IV c) II, III and IV d) I, II, III and IV

30. Which of the following features are correct regarding ribosomes?
I. Non-membrane bound
II. Absent in plastids and mitochondria
III. Present in the cytoplasm and RER
IV. Take part in protein synthesis
The correct option is
a) Only II b) I and II c) I, II, III and IV d) I, III and IV

31. In prokaryotic cell,
I. enveloped genetic material is present
II. ribosomes are absent
III. an organised nucleus is absent
The correct option is
a) Only I b) Only II c) Only III d) I, II and III

32. In a DNA molecule, distance between two based is
a) 2 nm/20Å b) 0.2 nm/2Å c) 3.4 nm/34Å d) 0.34 nm/3.4Å

33. Antiparallel strands of a DNA molecule means that
a) One strand turns anti-clockwise
b) The phosphate groups of two DNA strands at their ends, share the same position
c) The phosphate groups at the start of two DNA strands are in opposite position(pole)
d) One strand turns clockwise

34. Arrange the following steps in a correct sequence as per Gram's staining technique
I. Treatment with 0.5% iodine solution
II. Washing with water
III. Treatment with absolute alcohol/acetone
IV. Staining with weak alkaline solution of crystal violet
The correct sequence is
a) II→I→IV→III b) IV→I→II→III c) III→II→I→IV d) I→IV→III→II

35. In eukaryotes, basic structural unit made up of histone and DNA is
a) Nucleosome b) Nucleolus c) Chromosome d) Lysosome

36. Choose the correct statement from the codes given below
I. Separation from extracellular medium allows the cells to maintain its chemical pool, orderliness of structure and reactions in contrast to disorderly distribution and randomly interacting molecules in the extra-cellular medium
II. Cells are unable to recognise one another due to the present of specific chemicals on their surface
III. Cells of plant tissues are often connected with one another through cytoplasmic bridges called plasmodesmata
IV. Different cells of an organism communicate as well as exchange materials with one another
a) II and III b) I and II c) I, III and IV d) I, II, III and IV

37. DNA multiplication is called
a) Translation b) Replication c) Transduction d) Transcription

38. Ribosomes are found in
a) Cytoplasm and nucleus
b) Golgi complex and nucleus
c) Mitochondria and bacterial cell
d) Endoplasmic reticulum and Golgi complex

39. In protoplasm, fat store in the form of
a) Polypeptide b) Triglyceride c) Polysaccharide d) Nucleoside

40. Spindles are formed by
a) Microtubules
b) Endoplasmic reticulum
c) Golgi body
d) Peroxisomes

41. 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 option
a) A-capsule; B-slime layer
b) A-slime layer, B-capsule
c) A-mesosome; B-capsule
d) A-mesosome, B-slime layer

42. Function of rough endoplasmic reticulum is
a) Fat synthesis b) Protein synthesis c) Starch synthesis d) Autolysis

43. Comparing small and large cells, which statement is correct?
a) Small cells have a small surface area per volume ratio
b) Exchange rate of nutrients is fast with large cells
c) Small cells have a large surface area per volume ratio
d) Exchange rate of nutrients is slow with small cells

44. Unicellular organisms are
a) Not capable of independent existence because they cannot perform all the essential functions of life
b) Not capable of independent existence but they can perform all the essential functions of life
c) Capable of independent existence and can perform all the essential vital functions
d) Capable to lead independent existence but they perform few vital functions of life

45. Stain used by Feulgen to stain DNA is
a) Janus green b) Basic fuchsin c) Crystal violet d) Methylene blue

46. Out of A-T, G-C pairing, bases of DNA may exist in alternate valency state owing to arrangements called
a) Tautomerisational mutation
b) Analogue substitution
c) Point mutation
d) Frameshift mutation

47. Robert Hooke used the term cell in the year
a) 1650 b) 1665 c) 1865 d) 1960

48. Okazaki fragments are produced during the synthesis of
a) mRNA b) Protein c) tRNA d) DNA

49. Cellulose, the most important constituent of plant cell wall is made up of
a) Branched chain of glucose molecules linked by α 1-6 glycosidic bond at the site of branching
b) Unbranched chain of glucose molecules liked by α, 1-4 glycosidic bond
c) Branched chain of glucose molecules linked by β,1-4 glycosidic bond in straight chain and α, 1-6 glycosidic bond at the site of branching
d) Unbranched chain of glucose molecules liked by β, 1-4 glycosidic bond

50. In flagella membrane, which enzyme catalysis ATP activity?
a) Cytoplasmic dyenin b) Asconic dynein c) Kinesis d) Myosin

51. During the replication of DNA, the synthesis of DNA on lagging strand takes place in segments. These segments are called
a) Double helix segments
b) Satellite segments
c) Kornberg segments
d) Okazaki segments

52. In DNA of certain organisms, guanine constitutes 20% of the bases. What percentage of the bases would be adenine?

a) 0% b) 10% c) 20% d) 30%

53. The term 'protoplasm' was coined by
a) Virchow b) Purkinje c) Dujardin d) Kolliker

54. Select the incorrect statement
a) Robert Brown discovered cell
b) Antony von Leeuwenhoek first saw and described a living cell
c) Cell is the basic unit of structure and function of all organisms
d) Anything less than a complete structure of a cell do not ensure independent living

55. Which of the following is responsible for the origin of lysosome?
a) Chloroplast b) Mitochondria c) Golgi body d) Ribosome

56. In his bacteriophage experiments, Hershey and Chase demonstrated that DNA is genetic material in
a) TMV b) *Escherichia coli*
c) T_2 bacteriophage d) *Diplococcus pneumoniae*

57. The length of DNA molecule greatly exceeds the dimensions of the nucleus in eukaryotic cells. How is this DNA accommodated?
a) Deletion of non-essential genes b) Super-coiling in nucleosomes
c) DNA se digestion d) Through elimination of repetitive DNA

58. Diameter of DNA is constant due to
a) Hydrogen bonds between base pairs b) Phosphodiester bond
c) Disulphide bond d) Covalent bonds

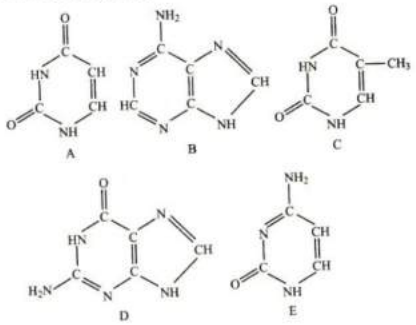
59. Which of the following sugars is found in nucleic acid?
a) Dextrose b) Glucose c) Levulose d) Deoxyribose

60. Categorise the given statements as true and false
I. Kingdom - Monera have eukaryotic organisation
II. *E. coli* is a eukaryote
III. Organised nucleus is present in eukaryotes
IV. *Paramecium* is a prokaryote
a) T, T, F, F b) F, F, T, T c) F, F, T, F d) T, T, T, F

61. Which of the following statements are correct about prokaryotic genetic material (DNA)?
I. DNA is naked, that is without histones
II. DNA is usually circular/single chromosome
III. Outside the genomic DNA, small circular DNA is also present in many bacteria
IV. The smallest DNA are called plasmids
a) I and II b) I and III c) Only I d) I, II, III and IV

62. Golgi body originates from
a) Lysosome b) Endoplasmic reticulum
c) Mitochondria d) Cell membrane

63. The following diagrams represent the nitrogenous bases of nucleic acid molecules. Identify the correct combination.



a) A- Uracil, B- Adenine, C- Thymine, D- Guanine, E- Cytosine
b) A- Uracil, B- Guanine, C- Cytosine, D- Adenine, E- Thymine

c) A- Thymine, B- Adenine, C- Cytosine, D- Guanine, E- Uracil
d) A- Uracil, B- Guanine, C- Uracil, D- Adenine, E- Cytosine

64. Extension of plasma membrane in prokaryotic cell is
a) Mesosome b) Haploid c) Ribosome d) None of these

65. A biomembrane consists of lipids, proteins carbohydrates and water. These lipid molecules are
a) Amphiatic
b) Amphipathic
c) Both polar hydrophilic and non-polar hydrophobic ends
d) All of the above

66. Thread like protoplasmic projections on the free surface of absorptive cells (such as intestinal cells) are called
a) Plasmodesmata b) Microfilaments c) Cilia d) None of these

67. ..... are an exception to cell theory
a) Bacteria b) Fungi c) Viruses d) Lichens

68. Structural lipids of cell membrane are
a) Simple lipid b) Chromolipids c) Steroid d) Phospholipids

69. Quantasomes are present in
a) Chloroplast b) Mitochondria c) Golgi body d) Lysosome

70. The chemical substances found most abundantly on the middle lamella are released into the phragmoplast by
a) Endoplasmic reticulum b) Golgi complex
c) Spindle fragments d) Interzonal fibres

71. 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 statement is incorrect?
a) Proteins in cell membranes can travel within the lipid bilayer
b) Proteins can remain confined within certain domains of the membrane
c) Proteins can also undergo flip-flip movements in the lipid bilayer
d) Many proteins remain completely embedded within the lipid bilayer

72. Okazaki fragments are joined in a correct sequence by
a) DNA polymerase b) DNA ligase c) RNA polymerase d) Primase

73. Which of the following cell organelles stores hydrolytic enzymes?
a) Centriole b) Lysosome c) Chromoplast d) Chloroplast

74. Cell is the fundamental structural and functional unit of all living organisms. This was evidenced by the fact that
a) All cells arises by the fusion of two cells b) All cells are totipotent
c) Subcellular components can regenerate a complete cell d) Anything less than a complete structure of a cell does not ensure independent living

75. What is mitoplast?
a) Membraneless mitochondria b) Another name of mitochondria
c) Mitochondria without outer membrane d) Mitochondria without inner membrane

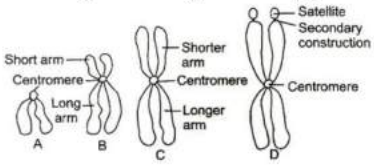
76. Assembly of two subunits, 40S and 60S of the ribosome is
a) 100S b) 80S c) 70S d) 50S

77. Cell membrane of eukaryotes is composed of
a) Carbohydrates and proteins b) Proteins and lipids
c) Carbohydrates and lipids d) Carbohydrates, lipids and proteins

78. Sigma factor is related to
a) RNA polymerase b) DNA polymerase c) Both (a) and (b) d) None of these

79. The figures of cork cells as seen by Robert Hooke were published in the book
a) *Origin of Species* b) *Genera Plantarum* c) *Micrographia* d) *Species Pantarum*

80. Robert Hooke thought about the cells that
    a) Something similar to veins and arteries of animals for conducting fluid.
    b) Smallest structural unit
    c) Smallest functional unit
    d) Unit of heredity
81. Ribosomal RNA (rRNA) is synthesised in
    a) Nucleolus b) Nucleosome c) Cytoplasm d) Ribosome
82. Which of the following organelles does not contain RNA?
    a) Chromosome b) Plasmalemma c) Nucleolus d) Ribosome
83. In the given diagram of types of chromosomes, identify *A-D*



    a) A-Telocentric chromosome, B-Acrocentric chromosome, C-Submetacentric chromosome, D-Metacentric chromosome
    b) A-Acrocentric chromosome, B-Telocentric chromosome, C-Metacentric, chromosome, D-Submetacentric chromosome
    c) A-Submetacentric chromosome, B-Metacentric chromosome, C-Telocentric chromosome, D-Acrocentric chromosome
    d) A-Metacentric chromosome, B-Submetacentric chromosome, C-Acrocentric chromosome, D-Telocentric chromosome
84. Read the following statements and identify the correct option given.
    I. In prokaryotic cell, the nuclear membrane, chloroplast, mitochondria, microtubules and different kinds of pili are absent.
    II. In eukaryotic cell, the nuclear membrane, chloroplast, mitochondria and pili are present.
    III. In prokaryotic cell, the ribosome is of 70 S type and in mitochondria of eukaryotic animal cell, the ribosome is 80 S type
    a) I and II are wrong; III is correct b) I is correct; II and III are wrong
    c) I and III are correct; III is wrong d) I, II and III are wrong
85. Schleiden (1838) proposed that cell is the structural and functional unit of life. His idea was a/an
    a) Assumption b) Generalisation c) Hypothesis d) Observation
86. In DNA, which of the following is absent?
    a) Adenine b) Thymine c) Guanine d) Uracil
87. Which of the following enzymes has/have haeme as a prosthetic group?
    I. Catalase
    II. Carboxypeptidase
    III. Succinic dehydrogenase
    IV. Peroxidase
    a) I only b) I and II c) II and III d) I and IV
88. In prokaryotes, chromatophores are
    a) Specialised granules responsible for colouration of cells
    b) Structures responsible for organising the shape of the organism
    c) Incusion bodies lying free inside the cells for carrying out various metabolic activities
    d) Internal membrane system that may become extensive and complex in photosynthetic bacteria
89. hnRNA undergoes two additional processing. Out of which, in one of them an unusual nucleotide (methyl guanosine triphosphate) is added to the 5' – end of hnRNA. This is known as
    a) Capping b) Tailing c) Splicing d) Termination

90. In prokaryotic cells, an organelle like the one is eukaryotic cells is
a) Lysosomes b) Golgi apparatus c) Ribosomes d) Plastids

91. Amino acid binding site in *t*RNA is
a) 5' end b) Anticodon loop c) CCA 3' end d) DHU loop

92. Protoplasm of a eukaryotic cell is called
a) Chloroplast b) Protoplast c) Cytoplasm d) Endoplast

93. In which cell organelles, a lipoprotein covering is absent?
a) Ribosomes b) Lysosomes c) Mitochondria d) Peroxisomes

94. The infoldings in mitochondria are known as
a) Cristae b) Matrix c) Cisternae d) Thylakoids

95. Which one is the correct statement about the bacterial cell envelope?
a) The outermost cell wall is followed by glycocalyx and then the plasma membrane
b) Cell envelope is chemically very simple and consists of only plasma membrane
c) The outermost glycocalyx is followed by cell wall and plasma membrane
d) The outermost glycocalyx is followed by plasma membrane and then the cell wall

96. Arrange the following cells in an ascending order of their size and select the correct option
I. Ostrich eggs
II. Mycoplasma
III. Bacteria
IV. Human RBCs
a) II→III→IV→I b) I→IV→III→II c) II→I→IV→III d) I→II→IV→III

97. Eukaryotes includes
a) Protists b) Fungi c) Plants d) All of these

98. Which enzyme joins DNA fragments?
a) DNA ligase b) DNA polymerase c) DNA gyrase d) Topoisomerase

99. What is C-value paradox?
a) Haploid DNA content b) Huge variations in C-values for all species
c) Constant C-value for all species d) Diploid DNA content

100. In fluid mosaic model of plasma membrane
a) Upper layer is non-polar and hydrophilic
b) Polar layer is hydrophobic
c) Phospholipids form a bimolecular layer in middle part
d) Proteins from a middle layer

101. If a length of DNA has 45,000 base pairs, how many complete turns will the DNA molecule takes?
a) 4,500 b) 45,000 c) 45 d) 450

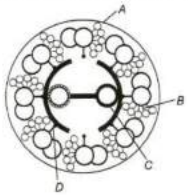
102. The distance between two base pairs in DNA is
a) 34Å b) 3.4Å c) 0.34Å d) 20Å

103. Analyse the following pairs and identify the correct option given.
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 are correct b) III and IV are correct
c) IV and V are correct d) I and II are correct

104. Which of the following is not relevant to the structure of double helical DNA?
a) The helix makes one completer spiral turn every 34Å
b) The diameter of the helix is 20Å
c) The distance between adjacent nucleotide is 3.4Å
d) Each strands of helix has a backbone made up of alternating ribose sugar and phosphate

105. RNA has uracil instead of
a) Cytosine b) Guanine c) Thymine d) None of these

106. Identify *A* to *D* in the diagrammatic representation of internal structure of centrioles



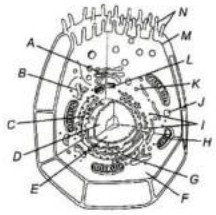
a) A-Interdoublet bridge, B-Central microtubule, C-Plasma membrane, D-Radial spoke
b) A-Plasma membrane, B-Central microtubule, C-Interdoublet bridge, D-Radial spoke
c) A-Plasma membrane, B-Interdoublet bridge, C-Central microtubule, D-Radial spoke
d) A-Plasma membrane, B-Interdoublet bridge, C-Radial spoke, D-Central microtubule

107. Which of the following cellular organelles is/are bound by a single membrane?
Peroxisomes, lysosomes, mitochondria
a) Only peroxisomes but not lysosomes and mitochondria
b) Both peroxisomes and lysosomes but not mitochondria
c) All of the three organelles
d) None of the three organelles

108. Red colour of tomato is due to
a) β-carotene b) Anthocyanin c) Lycopene d) Erythrocyanin

109. What is the difference between RNA and DNA?
a) Base b) Sugar c) Both (a) and (b) d) Phosphate

110. Correlate the given features of animal cells (I to VII) with their respective parts (*A* to *N*)



I. The structure replicates during mitosis and generates the spindle
II. Major site for synthesis of lipid
III. Power house of the cell
IV. store house of digestive enzyme
V. Increase the surface are for the absorption of materials
VI. Site of glycolysis
VII. Site for active ribosomal RNA synthesis
The correct option is
I II III IV V VI VII
a) L G H J N F D b) M G H J N F D
c) L B H J N F D d) M A H J N F D

111. Cell membrane was discovered by Schwann (1838) but it was named by
a) Nageli and Cramer b) Schwann and Schleiden
c) Robert Brown d)

112. Which of the following is not present in cell vacuoles?
a) Hydrolytic enzymes b) Latex of the rubber plant
c) DNA d) Anthocyanins of the flowers

113. Plasmodesmata are
a) Lignifiesd cemented between cells
b) Locomotory structures
c) Membranes connecting the nucleus with plasmalemma

d) Connections between adjacent cells

114. If a cell has a twice as much DNA as in a normal functional cell it means that the cell
   a) Is preparing to divide
   b) Has completed division
   c) Has reached the end of its life span
   d) Has ceased to function

115. Within the nucleus DNA is organised along with proteins into material called
   a) Nuclear lamina
   b) Chromatin
   c) Chromosome
   d) Chromatid

116. The molecular action of UV light is mainly reflected through
   a) Photodynamic action
   b) Formation of pyrimidine
   c) Formation of sticky metaphases
   d) Destruction of hydrogen bonds between DNA strands

117. Three of the following statements regarding cell organelles are correct, while one is wrong. Which one is wrong?
   a) Lysosomes are double membraned vesicles budded off from Golgi apparatus and contain digestive enzymes
   b) Endoplasmic reticulum consists of a network of membranous tubule and helps in transport, synthesis and secretion
   c) Leucoplasts are bound by two membranes, lack pigment but contain their own DNA and protein synthesising machinery
   d) Sphaerosomes are single membrane bound and are associated with synthesis and storage of lipids

118. Plasmodesmata connections helps in
   a) Cytoplasmic streaming
   b) Synchronous mitotic divisions
   c) Locomotion of unicellular organisms
   d) Movement of substances between cells

119. Which of the following pair is mismatched?
   a) Capsule – Thick and tough glycocalyx
   b) Slime layer – Loose glycocalyx
   c) Pilli – Motility organ
   d) Bacterial cells – Motile or non-motile

120. The rough endoplasmic reticulum (RER) in the cells are because of the presence of
   a) Mitochondria associated with ER
   b) Ribosomes on the surface of ER
   c) Volutin granules on the surface of ER
   d) Sulphur granules on the surface of ER

121. Which one of the following is the correct matching of three items and their grouping category?

a)

Item	Group
Malleus, incus, cochlea	Ear ossicles

b)

Ilium, ischium, pubis	Coxal bones of pelvic girdle

c)

Actin, myosin, rhodopsin	Muscle proteins

d)

Cytosine, uracil, thiamine	Pyrimidines

122. The two subunits of ribosome remain united at a critical ion level of
   a) Copper
   b) Manganese
   c) Magnesium
   d) Calcium

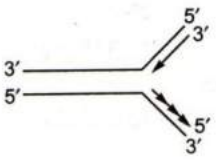
123. Study of form, structure and composition of cells is called
   a) Cell biology
   b) Cytology
   c) Cell theory
   d) Cell chemistry

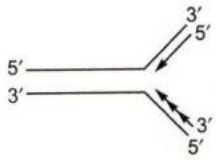
124. Acid hydrolase is found in
   a) Golgi body
   b) ER
   c) Lysosome
   d) Vacuole

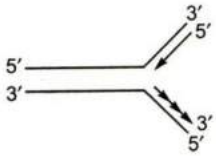
125. Which of the following maintains continuity between the water and lipid phases inside and outside the cells?
   a) Cell Wall
   b) Lecithin
   c) Cell vacuole
   d) Cell membrane of woody plants

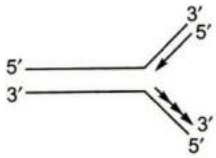
126. Cytoskeleton is made up of
   a) Calcium carbonate granules
   b) Callose deposits
   c) Cellulosic microfibrils
   d) Proteinaceous filaments

127. Which one of the following correctly represents the manner of replication of DNA?

a) 

b) 

c) 

d) 

128. The mineral present in cell wall is
a) Na b) Ca c) K d) Mn

129. Lipid bilayer is present in
a) Plasma membrane b) Ribosome c) Chromosome d) Nucleolus

130. Endoplasmic reticulum is in continuation with
a) Golgi body b) Nuclear wall c) Mitochondria d) Cell wall

131. Which of the following is the filler substance of the matrix of eukaryotic cell?
a) Pectin b) Cutin c) Lignin d) Suberin

132. Which of the following does not contain DNA?
a) Mitochondria b) Chloroplast c) Peroxisome d) Nucleus

133. The fluidity of membranes in a plant in cold weather may be maintained by
a) Increasing the number of phospholipids with unsaturated hydrocarbon tails
b) Increasing the proportion of integral proteins
c) Increasing concentration of cholesterol in membrane
d) Increasing the number of phospholipids with saturated hydrocarbon tail

134. In a double helix of DNA molecule of 10 coils, if there are 30 adenine nitrogen bases, what is the number of guanine nitrogen bases?
a) 30 b) 60 c) 70 d) 80

135. The study related to the structure and function of a cell is called
a) Physiology b) Cytology c) Histology d) Cellology

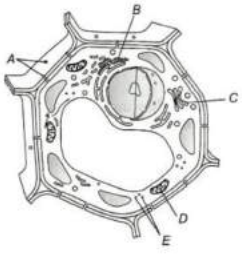
136. Cell theory was proposed by
a) Virchow b) Schleiden and Schwann
c) Robert Hooke d) Barbara McClintock

137. Pits present in the wall of plant cells helps to produce a protoplasmic continum, called..... amongst cells
a) Apoplast b) Symplast c) Osmosis d) None of these

138. Main component of ribosome are
a) DNA and RNA b) RNA and protein c) DNA and protein d) Protein and lipids

139. Statements
I. The four nucleotide bases are not necessarily present in DNA in exact equal proportions.
II. The total amount of purines are equal to the total amount of pyrimidines.
III. DNA ligase enzyme act to hydrolyse or breakdown a polynucleotide chain into its component nucleotides.
IV. Nuclease enzymes are capable of restoring an intact DNA duplex.
Of the above statements
a) II is correct, but I, III and IV are wrong b) I and II are wrong but III and IV are correct
c) I, II and III are correct but IV is wrong d) I and II are correct but III and IV are wrong

140. The following diagram shows some of the missing structures in a plant cell (A-E). Identify the structures



a) A-Plasmodesmata, B-Rough endoplasmic reticulum, C-Golgi apparatus, D-Mitochondrion, E-Ribosomes
b) A-Desmosome, B-Rough endoplasmic reticulum, C-Golgi apparatus, D-Mitochondrion, E-Ribosomes
c) A-Plasmodesmata, B-Smooth endoplasmic reticulum, C-Golgi apparatus, D-Mitochondrion, E-Ribosomes
d) A-Tight junction, B-Rough endoplasmic reticulum, C-Golgi apparatus, D-Mitochondrion, E-Ribosomes

141. Which is not true about spherosomes?
a) Arise from ER
b) Related to fat
c) Single membrane bound structure
d) Involved in photorespiration

142. Elaioplasts store
a) Starch
b) Proteins
c) Fats
d) Essential amino acids

143. Which of the following is the function of cytoskeleton?
a) Intracellular transport
b) Maintenance of cell shape and structure
c) Support of the organelles
d) All of the above

144. Vital stains are employed to study
a) Living cells
b) Frozen tissues
c) Fresh tissues
d) Preserved tissues

145. Which one of the following is not a plastid?
a) Mitoplast
b) Chromoplast
c) Chloroplast
d) Leucoplast

146. Which of these is wrongly matched?
a) Chloroplasts - Chlorophyll
b) Elaioplasts - Starch
c) Chromoplasts - Carotenoids
d) Amyloplasts - Carbohydrates

147. In DNA structure, Nobel Prize was given to
a) Macria Wilkins
b) Franklin
c) Pauly
d) Watson and Crick

148. Phagocytosis and pinocytosis are collectively termed as
a) Endocytosis
b) Suspension feeding
c) Omnivores
d) Mucous trap

149. The following ratio is generally constant for a given species
a) A+G/C+T
b) T+C/G+A
c) G+C/A+T
d) A+C/T+G

150. Cell theory is not applicable for
a) Bacteria
b) Fungus
c) Algae
d) Virus

151. In multicellular organisms, the 70 S ribosomes are found in the following parts of the cells
a) Lysosomes
b) Mitochondria
c) Nucleus
d) Endoplasmic reticulum

152. Ribosomes are particles about 200Å units in diameter consisting of protein and RNA. The percentage of protein and RNA respectively is
a) 60% and 40%
b) 40% and 60%
c) 80% and 20%
d) 50% and 50%

153. The term 'cytoplasm' and 'nucleoplasm' were given by
a) Purkinje
b) Strasburger
c) Brown
d) Flemming

154. Which is not true about prokaryotes?
a) DNA is complexed with histones
b) Well developed nucleus absent
c) Mesosome present
d) Mitochondria absent

155. Nuclear membrane is continuous with
a) Rough endoplasmic reticulum
b) Smooth endoplasmic reticulum
c) Cell membrane
d) Golgi bodies

156. Protein synthesis takes place in
a) Ribosome
b) Chloroplast
c) Mitochondria
d) Golgi bodies

157. Structure of nuclear membrane help in
a) Organisation of the spindle
b) Synapsis of homologous chromosome
c) Nucleo-cytoplasmic exchange of material
d) Anaphasic separation of daughter chromosome

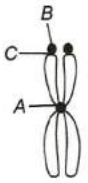
158. The ATP synthase of chloroplasts is like that of

a) Peroxisomes b) Golgi body c) Microsomes d) Mitochondria

159. Protoplast denotes the ..... of protoplasm present in a cell
a) Whole b) Half c) One fourth d) Double

160. An organism exclusively with 70 S type of ribosomes contains one of the following
a) DNA enclosed within the nuclear membrane b) Circular naked DNA
c) Double-stranded DNA with protein coat d) Single-stranded DNA with protein coat

161. Which of the following is the correct representation of *A*, *B* and *C* in the given figure of a chromosome?



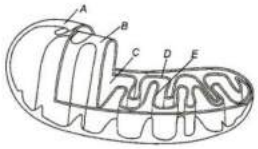
a) A-Centromere, B-Satellite, C-Secondary constriction
b) A-Centromere, B-Satellite, C-Primary constriction
c) A-Centriole, B-Satellite, C-Primary constriction
d) A-Centriole, B-Satellite, C-Secondary constriction

162. In the DNA molecule,
a) The total amount of purine nucleotides and pyrimidine nucleotides is not always equal
b) There are two strands, which run parallel in the 5'→3' direction
c) The proportion of adenine in relation to thymine varies with the organism
d) There are two strands, which run antiparallel-one in 5'→3' direction and other in 3'→5'

163. The Z-DNA helix is left handed and has a structure that repeats every
a) 2 base pairs b) 3 base pairs c) 4 base pairs d) 4 base pairs

164. The inward movement of ions into the cells is .....
and the outward movement is....
a) Influx, efflux b) Efflux, influx
c) Absorption, adsorption d) Adsorption, absorption

165. Go through the sectional view of a mitochondrion showing the different parts and identify the structures *A* to *E*



a) A-Outer membrane, B-Inner membrane, C-Matrix, D-Inter membrane space, E-Crista
b) A-Outer membrane, B-Inner membrane, C-Inter-membrane space, D-Matrix, E-Crista
c) A-Outer membrane, B-Inner membrane, C-Matrix, D-Crista, E-Inter membrane space
d) A-Outer membrane, B-Inner membrane, C-Crista, D-Matrix, E-Inter-membrane space

166. Centrioles arise
a) From pre-existing centrioles b) *de novo*
c) From spherosome d) From nuclear envelope

167. If there are 120 adenine molecules in a B-DNA double helical structure showing 20 coils, what is the number of pyrimidine nucleotides forming three hydrogen bonds in it?
a) 80 b) 100 c) 120 d) 140

168. Flocculation or coagulation of protoplasm is the
a) Interchangeability between sol and gel states
b) Ability to scatter that beam of light
c) Erratic zig-zag movement of protoplasmic particles
d) Ability of protoplasm to increase in size when they lose charges

169. Nucleolus is

a) Rounded structure found in cytoplasm near nucleus
b) Rounded structure inside nucleus and having rRNA
c) Rod-shaped structure in cytoplasm near the nucleus
d) None of the above

170. The process by which cells loose their specialisation is called
a) Differentiation b) Undifferentiation c) Dedifferentiation d) Premitotic division

171. Which one of the following nitrogenous bases is seen only in RNA?
a) Adenine b) Thymine c) Uracil d) Cytosine

172. Golgi complex works for
a) Excretion b) Respiration c) Secretion d) Reduction

173. Which statement is not true about prokaryotes?
a) DNA is completed with histones
b) Well-developed nucleus is absent
c) Mesosome is present
d) Mitochondria is absent

174. Which is not correct according to Chargaff's rule?
a) A + T= C + G b) A+ G = C+ T c) $\frac{A+G}{C+T}=1$ d) None of these

175. During DNA replication in prokaryotes, DNA is anchored to
a) Chromosome b) Mesosome c) Nucleolus d) Ribosome

176. Correct sequence of layers of bacterial cell envelope is
a) Cell membrane → glycocalyx → cell wall
b) Glycocalyx → cell wall → cell membrane
c) Glycocalyx → cell membrane → cell wall
d) Cell wall → glycocalyx → cell membrane

177. What is true about tRNA?
a) It binds with an amino acid at its. 3' end
b) It has five double stranded regions
c) It has a codon at one end which recognises the anticodon on messenger RNA
d) It looks like clover leaf in the three dimensional structure

178. The endoskeleton of cell is made up of
a) Deutoplasm
b) Protoplasm
c) Endoplasmic reticulum
d) Cell wall

179. Autonomic genome system is present in
a) Ribosomes and Golgi bodies
b) Golgi bodies and mitochondria
c) Mitochondria and chloroplasts
d) Chloroplasts and ribosomes

180. Choose the correct statements
I. Passive cells are larger in size
II. Larger cells have lower surface volume ratio
III. To remain active, larger cells are either cylindrical in shape or possess several extensions of the cell membrane, like microvilli
IV. Microvilli are found in all those cells, which are active in absorption
V. Microvilli (membrane infoldings) occurs in transfer cells found in plants in the region of absorption or secretion of nutrients
Option containing all correct statements is
a) I and IV b) I, II, III and IV c) I, III and II d) I, II, III, IV and V

181. Prokaryotic cells are generally..... and multiply more rapidly than the eukaryotic cells
a) Large b) Small c) Convex d) Biconcave

182. Animal cell contains non-membrane bound organelles called .....which helps in cell division
a) Nucleus b) Centriole c) Mitochondria d) Vacuoles

183. In prokaryotes, genetic material is
a) Basically naked
b) Enveloped by a nuclear membrane

c) Associated with histones
d) Linear

184. Which of the character is not applicable to *t*RNA?
a) It is the smallest of the RNAs
b) It acts as an adaptor for amino acid
c) It has a clover leaf like structure
d) It is the largest of the RNAs

185. Choose the incorrect match.
a) Nucleus – RNA
b) Lysosome – Protein synthesis
c) Mitochondria – Respiration
d) Cytoskeleton – Microtubules

186. Which of the following is the site of lipid synthesis?
a) Rough ER
b) Smooth ER
c) Golgi bodies
d) Ribosome

187. Which of the following cell organelles is rich in catabolic enzymes?
a) Chloroplast
b) Mitochondria
c) Golgi complex
d) Ribosome

188. There are special proteins that help to open up DNA double helix in front of the replication fork. These protein are
a) DNA ligase
b) DNA gyrase
c) DNA polymerase-I
d) None of these

189. Select the right option which relates to Schwann regarding the following statement
I. He reported that cells have a thin outer layer which is today known as plasma membrane
II. Cell wall is a unique character of the plant cell
III. Body of plants and animals are composed of cells and product of cells
Choose the correct option from below
a) All are incorrect
b) Only III is correct
c) All are correct
d) II and III are correct

190. Within the cell, ribosomes are found in
a) Cytoplasm
b) Chloroplasts (in plants) and mitochondria
c) Rough ER
d) All of the above

191. Which of the following characteristic is correct about cell of plant cells?
a) Plays role in protection
b) Helps in cell-cell interaction
c) Provides a barrier to undesirable macromolecules
d) All of the above

192. Which one is single membrane cell organelle?
a) Endoplasmic reticulum
b) Mitochondria
c) Lysosomes
d) Chloroplast

193. Middle lamella is composed of
a) Carbohydrate
b) Calcium pectate
c) Protein
d) Peptidoglycan

194. When a molecule moves across a membrane independent of other molecules, the process is called
a) Uniport
b) Symport
c) Antiport
d) Facilitated diffusion

195. Meselson and Stahl experiment proved
a) DNA is a genetic material
b) Central dogma
c) trasformation
d) Semi-conservation DNA replication

196. Which one of the following remains absent in prokaryotes?
a) Nuclear membrane
b) Ribosome
c) Cell wall
d) Plasma membrane

197. Thylakoids occur inside
a) Mitochondria
b) Chloroplast
c) Golgi apparatus
d) Endoplasmic reticulum

198. Cell organelle common in Monera and Protista is
a) Lysosome
b) Chloroplast
c) Ribosome
d) Vacuole

199. Ribozyme was discovered by
a) Kuhne
b) Duclaux
c) Cech *et al*
d) Altmann

200. Cellular respiration is carried out by

a) Ribosome b) Mitochondria c) Chloroplast d) Golgi bodies

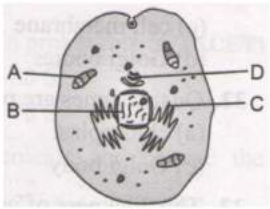
201. Which of the following enzyme is used in DNA multiplication?
a) RNA polymerase b) DNA endonuclease c) Exonuclease d) DNA polymerase

202. Which of the following is correct for middle lamella of eukaryotic cell?
a) It is formed as a cell plate during cytokinesis
b) It is mainly consists of Ca-pectate
c) It holds different neighbouring cells together
d) All of the above

203. Polyribosomes are aggregation of
a) Peroxisomes b) Ribosomes and rRNA
c) Several ribosomes help together by a string of mRNA d) rRNA and mRNA

204. Subunits in prokaryotic ribosomes are
a) 60S, 40S b) 50S, 30S c) 40S, 30S d) 50S, 20S

205. The RER in the cell synthesised protein which would be later used in building the plasma membrane. But it is observed that the protein in the membrane is slightly different from the protein made in the RER. The protein was probably modified in another cell organelle.
Identify the organelle in the given diagram.



a) D b) A c) B d) C

206. Plant cell may be without
a) Plastids b) Vacuoles c) Centrioles d) Cell wall

207. Robert Hooke developed a microscope with which he studied the internal structures of the cell. His work is famous for the study of
a) Cork cells b) Onion peel cells c) Human cheek cells d) Blood cells

208. The enzyme which helps to cut one strand of DNA duplex to release tension of coiling of two strands is
a) DNA ligase b) DNA polymerase-I
c) Topoisomerase d) Swielases (helicase or unwindases)

209. Cell wall consists of
a) Lignin, hemicellulose, protein and lipid b) Hemicelluloses, cellulose, tubulin and lignin
c) Lignin, hemicelluloses, pectin and lipid d) Lignin, hemicelluloses, pectin and cellulose

210. Which cell organelle is present in both prokaryotic and eukaryotic cell?
a) Ribosome b) Mitochondria c) ER d) Nucleus

211. Which of the following statements are false?
I. Most cells are tiny and their volume ranges from 1 to 1000 nm^3.
II. Some cells have the microvilli to increase the absorptive surface area.
III. All cells arise from pre-existing cells.
IV. In plants, translocation of solutes is performed by xylem vessels and tracheids.
V. According to cell theory, all cells arise from abiotic material.
a) I, III and V are false b) I, IV and V are false
c) II, III and IV are false d) III, IV and V are false

212. Flagella of prokaryotic and eukaryotic cells differ in
a) Type of movement and placement in cell
b) Location in cell and mode of functioning
c) Microtubular organisation and type of movement

d) Microtubular organisation and function

213. The surface of the endoplasmic reticulum (ER) is covered with
a) Ribosome b) DNA c) RNA d) Glucose

214. Keeping in view the 'fluid mosaic model' for the structure of cell membrane, which one of the following statement is correct with respect to the movement of lipids and proteins from one lipid monolayer to the other (described as flip-flop movement)?
a) Both lipids and proteins can flip-flop
b) While lipids can rarely flip-flop, proteins cannot
c) While proteins can flip-flop, lipids cannot
d) Neither lipids nor proteins can flip-flop

215. Which of the following statements are correct?
I. Human RBC is about 7.0 μm in diameter
II. Cytoplasm is the main arena of cellular activities
III. The shape of the cells may vary with the function they perform
IV. Various chemical reactions occur in cytoplasm to keep the cell in the living state
Choose the correct option
a) I, III and IV b) I, IV and II c) I, II, III and IV d) II, III and IV

216. In prokaryotic cells,
a) Internal compartments are absent b) Nucleus is absent
c) Ribosomes are 70S d) All of the above

217. Which of the following statements regarding cilia is not correct?
a) The organised beating of cilia is controlled by fluxes of Ca^{+}across the membrane
b) Cilia are hair-like cellular appendages
c) Microtubules of cilia are composed of tubulin
d) Cilia contain an outer ring of nine doublet microtubules surrounding two single microtubules

218. Glycocalyx is associated with
a) Nucleolus b) Plasma membrane c) Nucleus d) Nucleosome

219. Cell theory was formulated by
a) Schleiden and Schwann
b) Rudolf Virchow
c) Robert Brown
d) Robert Hooke

220. The main organelle involved in modification and routine of newly synthesised proteins to their destination is
a) Mitochondria b) Endoplasmic reticulum
c) Lysosome d) Chloroplast

221. Plasma membrane helps in
a) Transportation of only water in and out of cell
b) Protein synthesis
c) Osmoregulation
d) Nucleic acid synthesis

222. Which of the following is a part of endomembrane system of eukaryotic cell?
a) Peroxisomes b) Chloroplasts c) Mitochondria d) Golgi complex

223. I. It is the extension of plasma membrane into the cytoplasm
II. It helps in cell wall formation, DNA replication, respiration, secretion processes, increases the surface area of plasma membrane and enzymatic contents. It also helps in cytokinesis
III. It I the characteristic of bacterial cells
The above features are attributed to bacteria
a) Plasmid b) Nucleoid c) Mesosome d) Pilus

224. Solenoid is a structure of

a) Nucleosomal organisation with 10nm thickness
b) Condensed chromatin fibre with 30nm diameter
c) Highly condensed form of chromatid with 300 nm thickness
d) Well organised chromatid with 700 nm thickness

225. DNA strand which is formed continuously in 5' → 3' direction is called
a) Lagging strand b) Leading strand c) Template strand d) Stranded strand

226. Which of the following organelle is present in highest number in secretory cells?
a) Dictyosome b) ER c) Lysosome d) Vacuole

227. Ribose sugar is present in
a) RNA polymerase, RNA and ATP
b) RNA only
c) RNA polymerase and ATP
d) RNA and ATP

228. All the statements are correct for prokaryotic cells, except
a) Few prokaryotic have cell walls without muramic acid
b) There is no well defined nucleus
c) Prokaryotes shows a wide variety of shapes and functions
d) The organisation of the prokaryotic cells is fundamentally similar

229. Which of the given statements are correct?
I. *Escherichia coli* is a Gram (−) bacteria
II. *Bacillus subtilis* is a Gram (+) bacteria
III. Working of the Gram's stain in Gram (−) bacteria is due to high lipid content of the cell wall, which gets dissolved in organic solvents like acetone
Choose the correct option
a) I and III b) II and III c) I and II d) I, II and III

230. Ribosomes are attached to endoplasmic reticulum through
a) Ribophorin b) Magnesium c) Peptidyl transferase d) *t*RNA

231. During replication of DNA, Okazaki fragments are formed in the direction of
a) 3'→5' b) 5'→3' c) 5'→5' d) 3'→3'

232. In eukaryotic cell, thylakoids, if present,
a) Are grouped inside the chloroplasts
b) Lies freely in the cytoplasm
c) Lies freely outside the cytoplasm
d) Grouped outside the cytoplasm

233. Difference between rough and smooth endoplasmic reticulum is that
a) Rough has ribosomes
b) Smooth has ribosomes
c) Smooth takes part in protein synthesis
d) Both has F_1- particles

234. Condensation product of adenine, ribose and phosphoric acid is named as
a) Adenosine b) Adenylic acid c) Adenine phosphate d) None of these

235. The enzyme used to join the DNA fragments is
a) Topoisomerase
b) Adenosine deaminase
c) DNA ligase
d) DNA polymerase

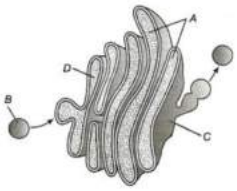
236. Export firm of the body is
a) Golgi bodies b) ER c) Nucleus d) Mitochondria

237. F_1 particles are present in
a) Chloroplast b) Mitochondria c) Ribosome d) Rough ER

238. Which of the following pairs is mismatched?
a) Pilli – involved in locomotion
b) Cell wall – protective, determines shape, prevents from bursting
c) Glycocalyx – may be capsule or slime layer
d) Flagella, pilli and fimbriae – surface structures of bacterial cell

239. Chlorophyll in chloroplasts is located in
a) Grana b) Pyrenoid c) Stroma d) Both (a) and (c)

240. Which one of the following is the correct labelling of given structure of Golgi apparatus?



a) A-Cisternae, B-Vesicle, C-*cis* face, D-*trans* face
b) A-Cisternae, B-Vesicle, C-*trans* face, D-*cis* face
c) A-Tubules, B-Vesicle, C-*trans* face, D-*cis* face
d) A-Vesicle, B-Cisternae, C-*cis* face, D-*trans* face

241. Ultimate unit of DNA is
a) Nucleotide b) Nucleosome c) Nucleoside d) Polynucleotide

242. DNA is denatured by
a) Heat b) Acid c) DNA polymerase d) Both (a) and (b)

243. Which sugar is present in nucleic acid?
a) Pentose b) Hexose c) Fructose d) Glucose

244. In prokaryotic cells, which enzyme erases primer and fill gaps in DNA
a) Helicase b) Primase c) DNA polymerase-II d) DNA polymerase-I

245. The crystals of calcium carbonate deposit in the cell is called
a) Aleurone b) Crystalloid c) Globoid d) Core type

246. Cell membrane controls
a) Exocytosis b) Endocytosis
c) Both (a) and (b) d) Not controls movement of substance

247. Adenosine monophosphate is a
a) Nucleoside of DNA b) Nucleotide of DNA c) Nucleoside of RNA d) Nucleotide of RNA

248. Smooth endoplasmic reticulum acts as a major site for the synthesis of
a) Lipids and steroids b) Proteins c) Ribosomes d) DNA

249. The nucleus is separated from surrounding cytoplasm by nuclear membrane, which is
a) Single-layered without pores b) Double-layered with pores
c) Single-layered with pores d) Double-layered without pores

250. The Okazaki fragments in DNA chain growth
a) Results in transcription
b) Polymeries in the 3' to 5' direction and form replication fork
c) Prove semi-conservative nature of DNA replication
d) Polymerise in the 5' to 3' direction and explain 3' to 5' DNA replication

251. Highest number of enzymes is found in
a) Lysosome b) chloroplast c) Mitochondria d) Peroxisome

252. In eukaryotes, the cell wall constitutes
a) Primary and secondary walls
b) Primary walls only
c) Primary wall, middle lamella and secondary
d) None of the above

253. Structural element of chromatin is
a) Histone b) Acid protein and DNA
c) Nuclear matrix d) Nucleosomes

254. Enzyme catalase is seen in
a) Lysosome b) Spherosome c) Peroxisome d) All of these

255. Vacuoles are separated from cytoplasm by a membrane called
a) Protoplast b) Cytoplasm c) Chloroplast d) Tonoplast

256. Complete the given NCERT statements (I-III) by choosing appropriate options for the blanks (A-D)
I. Cells that have membrane bound nuclei are called ...A...

II. In both ...B... and ...C... cells, cytoplasm is the main arena of cellular activities
III. Cell that lack a membrane bound nucleus are called ...D...
a) A-prokaryotic cells, B-plant cells, C-animal cells, D-eukaryotic cells
b) A-eukaryotic cells, B-animal cells, C-plant cells, D-prokaryotic cells
c) A-prokaryotic cells, B-plant cells, C-eukaryotic cells, D-animal cells
d) A-eukaryotic cells, B-plant cells, C-prokaryotic cells, D-animal cells

257. Which one of the following pairs of nitrogenous bases on nucleic acids, is wrongly matched with the category mentioned against it?
a) Thymine, uracil – Pyrimidines
b) Uracil, cytosine – Pyrimidines
c) Guanine, adenine – Purines
d) Adenine, thymine – Purines

258. Which one of the following is correctly matched?
a) Frederick Griffith - Discovered the phenomenon of transformation
b) Linus Pauling - Isolated DNA for the first time
c) Francis Crick - Proposed one gene-one polypeptide hypothesis
d) George Beadle - Proposed the concept of inborn errors

259. A nucleoside is
a) Purine/pyrimidine+phosphate
b) Purine/pyrimidine+sugar
c) Pyrimidine+purine+phosphate
d) Purine+sugar+phosphate

260. The membrane potential of cell favours the
a) Movement of cations into the cell
b) Movement of anions into the cell
c) Action of a proton pump
d) Action of an electrogenic pump

261. The prokaryotic cell does not contain
a) Chromosome b) Mitochondria c) Plasma membrane d) Ribosome

262. Histones are rich in
a) Alanine and glycine
b) Lysine and arginine
c) Histidine
d) Cysteine and tyrosine

263. Choose the incorrect option
a) Centriole – Composed of tubulin
b) Centrosome – Serves as microtubule organising centre
c) Centriole – Present in all plants and animals
d) Centrosome – Associated with nuclear membrane during interphase

264. Purines posses nitrogen at
a) 1, 2, 4 and 6 positions b) 1, 3, 5 and 7 positions c) 1, 3, 7 and 9 positions d) 1, 2, 6 and 8 positions

265. Number of carbons in ring of deoxyribose sugar is
a) Four b) Five c) Six d) Three

266. Single membrane bound organelles are
a) Lysosome b) Spherosome c) Gyloxysome d) All of these

267. Which one of the following statements is incorrect about the properties of DNA?
a) DNA is denatured when heated upto 70°C
b) DNA shows high absorption of UV radiation at 260 mμ
c) DNA directly participates in protein synthesis
d) Pyrimidines of DNA are cytosine and thymine

268. The term mitochondria was given by
a) Benda b) Altmann c) Palade d) de Duve

269. Cristae are associated with which of the following?
a) Mitochondria
b) Cytoplasm
c) Protoplasm
d) Endoplasmic reticulum

270. Fat storing granules are
a) Elaioplast b) Amyloplast c) Aleuroplast d) None of these

271. The Golgi apparatus

a) Is found only in animals
b) Is found in prokaryotes
c) Is a site of rapid ATP production
d) Modifies and packages proteins

272. Acrosome is formed by
a) Mitochondria b) Golgi body c) Ribosomes d) Lysosome

273. Select the wrong statement from the following
a) Both chloroplasts and mitochondria contain an inner and an outer membrane
b) Both chloroplasts and mitochondria have an internal compartment, the thylakoid space bounded by the thylakoid membrane
c) Both chloroplasts and mitochondria contain DNA
d) The chloroplasts are generally much larger than mitochondria

274. Golgi apparatus is absent in
a) Higher plant
b) Yeast
c) Bacteria and blue- green algae
d) Liver cells

275. Organisation of a cell has not been achieved in
a) Bacteriophage b) Bacteria c) Diatom d) *Amoeba*

276. Cellular totipotency was first demonstrated by
a) F C Steward b) Robert Hooke c) T Schwann d) A v Leeuwenhoek

277. Out of the given cell organelles, which does not possess DNA?
a) Peroxisome b) Chloroplast c) Mitochondria d) Nucleus

278. 'Plasma gel' is the name of
a) Ectoplasm b) Endoplasm c) Protoplasm d) None of these

279. Which of the following feature is common to prokaryotes and many eukaryotes?
a) Cell wall is present
b) Chromosomes are present
c) Sub-cellular organelles are present
d) Nuclear membrane is present

280. Which one of the following organisms is not an example of eukaryotic cells?
a) *Escherichia coli*
b) *Euglena viridis*
c) *Amoeba proteus*
d) *Paramecium caudatum*

281. Find the correct combination, that can form a nucleotide of RNA.
a) Adenine + deoxyribose +phosphate
b) Thymine + ribose + phosphate
c) Uracil + deoxyribose + phosphate
d) Uracil + ribose + phosphate

282. One turn of the helix in a B-form DNA is approximately
a) 20 nm b) 0.34 nm c) 3.4 nm d) 2 nm

283. F_1-particles present in mitochondria are
a) Episomes b) Spherosomes c) Oxysomes d) Microsomes

284. DNA consists of two complementary nucleotide chains. If the sequence of nucleotides in one of the chains is AGCTTCGA then the complementary sequence of the other chain will be
a) TCGAAGCT b) TCGTATCG c) AATTCCGG d) TCGAACTG

285. In a hair pin model of RNA, which nitrogen base is present at the short end?
a) Adenine b) Guanine c) Thymine d) Cytosine

286. The thickness of unit membrane is
a) 20Å b) 35Å c) 55Å d) 75Å

287. The plasma membrane consists mainly of
a) Phospholipids embedded in a protein bilayer
b) Proteins embedded in a phospholipid bilayer
c) Proteins embedded in a polymer of glucose molecules
d) Proteins embedded in a carbohydrate bilayer

288. Phosphorus is present in
a) Protein b) DNA c) RNA d) Both (b) and (c)

289. Which chapter of the book *Micrographia*, written by Robert Hooke gave birth to cell biology?
a) Observe XVII b) Observe XVI c) Observe XVII d) Observe XV

290. Material of the nucleus is stained by
a) Acidic dye b) Basic dye c) Neutral dye d) Iodine

291. When DNA replication starts
a) The leading strand produces Okazaki fragments
b) The hydrogen bonds between the nucleotides of two strands break
c) The phosphodiester bonds between the adjacent nucleotides break
d) The bonds between the nitrogen base and deoxyribose sugar break

292. Cell adhesion and cell recognition occur due to biochemicals of cell membrane named
a) Lipids b) Proteins
c) Glycoproteins and glycolipids d) Both (a) and (b)

293. Width of the DNA molecule is
a) 15 Å b) 20 Å c) 25 Å d) 34 Å

294. Which form of RNA has a structure resembling clover leaf?
a) rRNA b) hnRNA c) mRNA d) tRNA

295. Which one of the following is not a constituent of cell membrane?
a) Cholesterol b) Glycolipids c) Proline d) Phospholipids

296. Vacuole in a plant cell
a) Is membrane bound and contains storage proteins and lipids
b) Is membrane bound and contains water and excretory substance
c) Lacks membrane and contains air
d) Lacks membrane and contains water and excretory substance

297. Which one of the following also acts as a catalyst in bacterial cells?
a) sn RNA b) hn RNA c) 23 S r RNA d) 5 S rRNA

298. The number of hydrogen bonds between adenine and thymine in a DNA molecule is
a) Two b) Three c) Four d) Eight

299. Chemical constituent of cystolith in plants is
a) Calcium carbonate b) Calcium oxalate c) Calcium nitrate d) Calcium phosphate

300. Enzyme found functional in lysosome is
a) Acid phosphatase b) Basic phosphatase c) Oxidoreductase d) Liases

301. Primary wall of eukaryotic cell is ...A... layered but secondary wall is ...B... layered
Here, A and B refer to
a) A-three, B-more than three b) A-two, B-single
c) A-two, B-at least three d) A-single, B-two

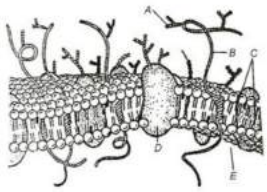
302. *In vitro* synthesis of RNA and DNA was carried out first by
a) Ochoa and Nirenberg b) Ochoa and Kornberg
c) Nirenberg and Khurana d) Kornberg and Nirenberg

303. In animal cell, reserve food is usually
a) Starch and fat b) Only fat c) Only starch d) Glycogen and fat

304. The type of ribosomes found in prokaryotes is
a) 70S type b) 80S type c) 30S type d) 50S type

305. In a DNA molecule, the adenine is 15%. What will be the percentage of guanine in this DNA?
a) 15% b) 35% c) 70% d) 30%

306. 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) A-1, B-2, C-3, D-4, E-5 b) A-2, B-1, C-3, D-4, E-5
c) A-1, B-2, C-3, D-6, E-4 d) A-1, B-2, C-3, D-7, E-5

307. Which of the following is not a characteristic of prokaryotic cells?
a) Circular DNA b) Mesosome
c) Photosynthetic membrane system d) Membrane bound organelles

308. Semi conservative replication of DNA was first demonstrated in
a) *Drosophila melanogaster* b) *Escherichia coli*
c) *Streptococcus pneumoniae* d) *salmonella typhimurium*

309. Consider the following statements and choose the correct options
I. The endomembrane system, include plasma membrane, ER Golgi complex, lysosomes and vacuoles.
II. ER helps in the transport of substamces, synthesis of proteins, lipoproteins and glycogen.
III. Ribosomes are involved in protein synthesis.
IV. Mitochondria help in oxidative phosphorylation and generation of ATP.
a) II, III and IV correct b) I is correct c) II is correct d) III is correct

310. Lysosomes are reservoirs (store house) of
a) Hydrolytic enzymes b) Secretory glycoproteins
c) RNA and protein d) Fats or sugars or ATP

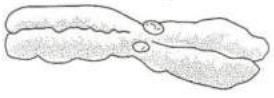
311. The nucleolus is the site of formation of
a) Spindle fibres b) Chromosomes c) Ribosomes d) Peroxisomes

312. Which of the following four cell structures is correctly matched with the accompanying description?
a) Plasma membrane – Lipid bilayer, in which proteins are embedded
b) Mitochondria – Bacteria like elements with inner membrane highly folded
c) Chloroplasts – Bacteria like elements with inner membrane forming sacs containing chlorophyll, found in plant cells and algae
d) Golgi apparatus – Stacks of flattened vesicles

313. In eukaryotic cells, genetic material or DNA is organised into
a) Chromosomes b) Chromatin
c) Chromosomes and chromatin d) None of the above

314. In a DNA, percentage of thymine is 20%. What is the percentage of guanine?
a) 20% b) 40% c) 30% d) 60%

315. The given diagram shows a chromosome



Which of the following data refer correctly to the chromosome?

	No. of Centromere	No. of Kinetochore	No. of Arms
a)	2	1	4
b)	1	2	4
c)	2	2	4
d)	1	2	2

316. Which of the following constitutes about 10-20 of total cellular RNA?
a) mRNA b) rRNA c) tRNA d) hnRNA

317. Kappa particles are
a) Protozoans parasite whose multiplication is controlled by host metabolites
b) Viral particles capable of self perpetuation in host cytoplasm
c) Endosymbiont representing Gram negative bacteria species
d) Sub-microscopic granules formed by the folding of naked DNA

318. In prokaryotes, the process of replication is catalysed by the following enzymes. Identify which of the enzymes is best coordinate with role.
a) Helicase – Joins the ends of DNA segments
b) DNA polymerase-I – Synthesises DNA
c) DNA polymerase-II - Erases primer and fills gaps
d) Primase – Synthesises RNA primers

319. A nucleosome is a portion of the chromonema containing
a) Only histones b) Both DNA and histones
c) Only DNA d) Both DNA and RNA

320. Plant and animal cells, both have
a) Cell membrane and nucleolus b) Cell membrane and cell wall
c) Nucleolus and chloroplast d) Nucleus and cell wall

321. DNA sequence that code for protein are known as
a) Introns b) Exons
c) Control regions d) Intervening sequences

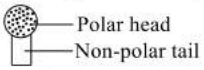
322. In eubacteria, a celluler component that resembles eukaryotic cells is
a) Nucleus b) Ribosomes c) Cell wall d) Plasma membrance

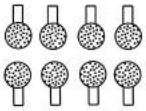
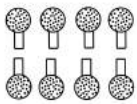
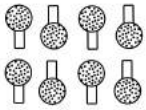
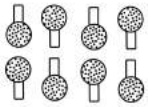
323. Pits are formed on the cell wall is due to lack of
a) Cell plate b) Primary wall material
c) Secondary wall material d) Middle lamellum

324. The four basic shapes of bacteria are
a) Amoeboid, elongated, biconcave and coccus b) Elongated, bacillus, biconcave and amoeboid
c) Bacillus, coccus, vibrio and spirillum d) Bacillus, amoeboid, elongated and coccus

325. Which of the following elements is very essential for uptake and utilisation of Ca^{2+} and membrane function?
a) Phosphorus b) Molybdenum c) Manganese d) Boron

326. The lipid molecules present in plasma membrane have polar heads and non-polar tails (as shown in figure). Which option represents the correct arrangement of lipids in lipid bilayer?



a)  b)  c)  d) 

327. Which is the initial step in mRNA maturation process?
a) Polyadenylation b) 5' capping
c) Splicing d) Endonucleolytic cleavage

328. Cell organelle responsible for autolysis is
a) Dictyosome b) Lysosome c) Peroxisome d) Glyoxysome

329. Identify the palindromic sequence in the following
a) $\frac{\text{GAATTC}}{\text{GAATTC}}$ b) $\frac{\text{GAATTC}}{\text{CTTUUG}}$ c) $\frac{\text{GAATTC}}{\text{CUUAAG}}$ d) $\frac{\text{GAATTC}}{\text{CTTAAG}}$

330. The largest subunit of prokaryotic ribosomes is
a) 30S b) 40S c) 50S d) 60S

331. In RNA, which is absent?
a) Adenine b) Guanine c) Thymine d) Cytosine

332. Most of the bacterial cell envelope consists of
a) Only glycocalyx
b) A tightly bound three layered structure
c) The cell membrane
d) Cell wall and cell membrane

333. DNA acts as a template for synthesis of
a) RNA b) DNA c) Both (a) and (b) d) Protein

334. Which one of the following has its own DNA?
a) Mitochondria b) Dictyosome c) Lysosome d) Peroxisome

335. What is a genophore?
a) DNA in prokaryotes
b) DNA and RNA in prokaryotes
c) DNA and protein in prokaryotes
d) RNA in prokaryotes

336. Select the double membrane bound cell organelles
a) Chloroplast b) Nucleus c) Mitochondria d) All of these

337. Fluid mosaic model was given by
a) Beadle and Tatum b) Jacob and Monod c) Singer and Nicolson d) Watson and Crick

338. The main arena of various types of activities of a cell is
a) Plasma membrane b) Mitochondrion c) Cytoplasm d) Nucleus

339. In plants, vacuole contains
a) Soil
b) Water and dissolved substance
c) Cytoplasm
d) All of the above

340. The process of removal of introns and joining of exons in called
a) Capping b) Tailing c) Termination d) Splicing

341. In chloroplasts, chlorophyll is present in the
a) Outer membrane b) Inner membrane c) Thylakoids d) Stroma

342. '*Omnis cellula-e-cellula*' (all cells arises from pre-existing cells). This concept was given by
a) Schleiden and Schwann
b) Virchow
c) Robert Brown
d) Leeuwenhoek

343. Difference between prokaryote and eukaryote is in
a) Cell size
b) Cell shape
c) Chemical composition of protoplasm
d) Organisation of nuclear material

344. Unicellular microscopic organism were first studied by
a) Pasteur b) Priestley c) Robert Hooke d) Leeuwenhoek

345. Which of the following is characteristic of phospholipids of plasma membrane?
a) One non-polar head and two polar tails
b) One polar head and two non-polar tails
c) Two non-polar heads and one polar tail
d) Two polar heads and one non-polar tail

346. Cell membrane is made up of
a) Protein
b) Cellulose
c) Lipids
d) Lipids, carbohydrates and protein

347. The double helix model of Watson and Crick is known as
a) C-DNA b) B-DNA c) Z-DNA d) D-DNA

348. Which of the following statement is incorrect about plasmids?
a) They are extrachromosomal DNA
b) They are used in genetic engineering
c) They help in the replication of nucleoid
d) They are small, circular and confer certain unique phenotypic characters to some bacteria like resistance to antibiotics

349. *E. coil* about to replicate was placed in a medium containing radioactive thymidine for five minutes. Then it was made to replicate in a normal medium. Which of the following observation will be correct?
a) Both the strands of DNA will be radioactive
b) One strand radioactive
c) Each half strand radioactive
d) None is radioactive

350. Golgi body arises from
a) Plasma membrane
b) ER
c) Vacuole
d) Chloroplast

351. Telomerase is an enzyme, which is a
a) Repetitive DNA
b) RNA
c) Simple protein
d) Ribonucleoprotein

352. In *Neisseria gonorrhoeae*, fimbriae takes part in ...A..., while in *Escherichia coli* it helps in ...B...
Choose appropriate options for A and B to complete the given statement
a) A-conjugation; B-attachment
b) A-attachment; B-conjugation
c) A-movement only; B-conjugation
d) A-attachment; B-movement only

353. Which of the following statements are correct?
I. Nerve cells are the smallest of all cells
II. Bacteria are 3-5 μm in length
III. The largest cell is the egg of an ostrich
IV. Mycoplasma is the smallest cell (0.3 μm in length)
Choose the correct option
a) I, II, III and IV
b) Only II
c) Only I
d) II, III and IV

354. The haploid content of human DNA is
a) 3.2×10^9 bp
b) 3.3×10^9kbp
c) 4.6×10^6 bp
d) 48502bp

355. Which is the common point of similarity between DNA and RNA?
a) Both are double stranded
b) Both have identical sugar molecules
c) Both have identical pyrimidine bases
d) Both are polymers of nucleotides

356. In prokaryotic cell, flagella, if present are
I. single-stranded
II. double-stranded
III. without differentiation of axoneme and sheath
IV. with differentiation of axoneme and sheath
Choose the correct option
a) Only I
b) Only III
c) I and II
d) I and III

357. Meselson and Stahl experiment on semi-conservative replication demonstrates
a) 60% radioactive, 50% non-radioactive
b) 50% non-radioactive
c) 50% radioactive
d) None of the above

358. Which of the following is the site of lipid synthesis?
a) Rough ER
b) Smooth ER
c) Golgi bodies
d) Ribosome

359. During endocytosis, the cell
a) Divides its cytoplasm during mitosis
b) Digests itself
c) Engulfs and internalises materials using its membrane
d) Enables the extracellular digestion of large molecules

360. DNA repairing is done by
a) Ligase
b) DNA polymerase-III
c) DNA-polymerase-II
d) DNA-polymerase-I

361. Which of the following statements are correct about prokaryotic cells?
I. DNA lies freely in the cytoplasm, not associated with any organelle
II. The amount of DNA do not change as there are no haploid and diploid stages
III. Transcription and translation occurs in the cytoplasm
IV. Protein synthesis occurs only in the cytoplasm
Correct option regarding the above statement is
a) I, II and III b) I and II c) Only I d) I, II, III and IV

362. The main function of lysosome is
a) Sexual reproduction b) Extracellular digestion
c) Intracellular digestion d) Both (b) and (c)

363. Which of the following cell(s) is/are exceptions to the cell theory?
a) Viriods b) Prions c) Viruses d) All of these

364. Naked DNA without histones is found in
a) Prokaryotes b) Eukaryotes c) Protozoa d) Coelenterate

365. Which is properly paired?
a) Golgi apparatus – Breaking of complex macromolecules
b) Endoplasmic reticulum – Protein synthesis
c) Chloroplast – Photosynthesis
d) Mitochondria – Oxidative phosphorylation

366. Which of the following statement is correct about the cell wall of prokaryotic cell?
I. Cell wall, if present, possesses muramic acid
II. Cell wall, if presents, possesses acitic acid
III. Cell wall is always absent
The correct options is
a) Only I b) Only II c) I, II and III d) Only III

367. Mechanical support, enzyme circulation, protein synthesis and detoxification of drugs are the functions of
a) ER b) Ribosomes c) Dictyosomes d) Chloroplast

368. An organelle with an internal cross section showing characteristic 9 +2 morphology is the
a) Microtubule b) Microfilament c) Cilium or flagellum d) Cytoskeleton

369. The RNA primer is used in
a) Translation b) Replication c) Conjugation d) Transformation

370. Genes present in the cytoplasm of eukaryotic cells are found in
a) Mitochondria and inherited *via* egg cytoplasm
b) Lysosomes and peroxisomes
c) Golgi bodies and smooth endoplasmic reticulum
d) Plastids are inherited *via* male gamete

371. Which of the following pairs lack the unit membrane?
a) Nucleus and ER b) Mitochondria and chloroplast
c) Ribosome and nucleolus d) Golgi body and lysosome

372. Which of the following statements are correct?
I. Mycoplasmas are the smallest cells
II. Nerve cells are some of the longest cells
III. Ribosomes are non-membrane bound organelles found only in eukaryotic cells
IV. The cytoplasm is the main arena of cellular activities only in plant cells
a) I, II and III b) I and II c) II and III d) I, II, III and IV

373. Schwann proposed a cell theory according to which
a) Each cell of the body posseses the same genetic information
b) All life activities of the organisms are present in miniature form in each and every cell of its body
c) Bodies of animals and plants are made up of cells and their products
d) A new cell always develops by the division of pre-existing cells

374. The length of DNA having 23 base pairs is
a) 78Å b) 78.4Å c) 74.8Å d) 78.2Å

375. Which of the following subunits of ribosome is composed of 23 S rRNA and a 5 S mRNA + 32 different proteins?
a) 50S b) 70S c) 30S d) 60S

376. Which of the following statements are correct?
I. A multicellular organism is composed of mainly three types of cells
II. Undifferentiated cells are stem cells and are unspecialised cells, which usually possesses the power of division
III. Differentiated cells are post-mitotic cells and are specialised to perform specific functions
IV. Dedifferentiated cells are differentiated cells which revert to undifferentiated state to take over the function of division
a) I, II and III b) Only I c) Except I d) I, II, III and IV

377. Ribosomes may also be called
a) Microsome b) Dictyosome c) Ribonucleoprotein d) Oxysomes

378. The scientist who was awarded Nobel-Prize in 1959 for *in vitro* synthesis of polyribonucleotide?
a) Mendel b) Calvin c) Khurana d) Ochoa

379. Which of the following statements regarding mitochondrial membrane is not correct?
a) The outer membrane is permeable to all kinds of molecules
b) The enzymes of the electron transfer chain are embedded in the outer membrane
c) The inner membrane in highly convoluted forming a series of infoldings
d) The outer membrane resembles a sieve

380. In a prokaryotic cell, the ratio of A + T/G + C is
a) > 1 b) < 1 c) $= 1$ d) None of these

381. Mitochondria are semi-autonomous as they possess
a) DNA b) DNA and RNA
c) DNA, RNA and ribosomes d) Protein

382. Many cells function properly and divide mitotically even though they do not have
a) Plasma membrane b) Cytoskeleton c) Mitochondria d) Plastids

383. In a DNA segment having six coils, there are 22 nitrogen base pair linked by two hydrogen bonds. How many cytosine bases are found in that segment?
a) 22 b) 38 c) 44 d) 76

384. The chromosome in which centromere lies slightly away from the middle of the chromosome resulting in one shorter arm and one longer arm, is called
a) Metacentric b) Submetacentric c) Acrocentric d) Telocentric

385. A cell organelle that is exceptionally rich in hydrolytic enzymes is
a) Ribosome b) Endoplasmic reticulum
c) Lysosome d) Mitochondria

386. Term basal body is associated with the development of
a) Cilia and flagella b) Cell plate c) Phragmoplast d) Kinetochore

387. Sequence of DNA (non- coding) is known as
a) Exon b) Intron c) Cistron d) None of these

388. Tonoplast is a membrane, which surrounds
a) Ribosome b) Mitochondria c) Vacuole d) Cytoplasm

389. Lipid molecules in plasma membrane are arranged in which manner?
a) Scattered b) Series c) Alternate d) Head parallel

390. F_1-particles comprise of
a) Head and base b) Base and stalk c) Head and stalk d) Head, base and stalk

391. Which of the following statement was not explained in the cell theory given jointly by Schleiden and Schwann?

a) All living organisms are composed of cells and their products
b) Cell is the structural and functional unit of living organisms
c) Formation of new cells
d) None of the above

392. For the study of structure of nucleus, the best cell is
a) Cell in the interphase
b) Cell in the late prophase
c) Cell in the divisional phase
d) Cell in the meiotic phase

393. Cell organelle without a membrane is
a) Mitochondria
b) Liposomes
c) Ribosome
d) Microsome

394. Nobody can have life if its constituent parts are not formed of cells. It was observed by
a) Robert Hooke
b) Mathias Schleiden
c) Lamarck
d) Louis Pasteur

395. If the cell wall of a cell is removed, the remaining is called
a) Etioplast
b) Aleuroplast
c) Amyloplast
d) Protoplast

396. The statement *omnis cellula e cellula* of Rudolf Virchow has been taken from his book
a) Cellular Pathology
b) Cellular Potency
c) Micrographia
d) Scala Naturae

397. Carrier ions like Na^+ facilitate the absorption of substances like
a) Amino acids and glucose
b) Glucose and fatty acids
c) Fatty acids and glycerol
d) Frustose and some amino acids

398. The transport of metabolities across the biomembrane occurs through
a) Passive transport
b) Active transport
c) In case of bacteria, plasma membrane forms extensions to form special membranous structure called mesosomes
d) All of the above

399. The number of base pairs per helical turn in Z-DNA is
a) 10
b) 11
c) 12
d) 13

400. Important site for formation of glycoproteins and glycolipids is
a) Golgi apparatus
b) Plastid
c) Lysosome
d) Vacuole

401. Which of the following represents prokaryotic cells?
a) PPLO
b) Mycoplasma
c) Bacteria
d) All of these

402. Movement of cytoplasm around the vacuole in the cell is called as
a) Circulation
b) Rotation
c) Somersault
d) Regulation

403. Which of the following statement is not correct for prokaryotic cell?
a) Prokaryotes have no chromosomes and therefore, lack DNA
b) Prokaryotic flagella are similar in structure to eukaryotic flagella
c) Because prokaryotes do not contain organelles, they cannot perform photosynthesis or carry out cellular respiration
d) All of the above

404. DNA can be formed by
a) Transaminase
b) Lyases
c) RNA dependent DNA polymerase
d) All of the above

405. Select the correct fundamental features of cell theory
I. All cells are basically alike in their chemistry and physiology
II. All living organisms are composed of cells and their products
III. Each cell is made of a small mass of protoplasm containing a nucleus inside and a plasma membrane with or without a cell wall outside
IV. Activities of an organism are the sum total of activities and interaction of its constituent cells
Correct option regarding the statement is
a) All are incorrect
b) II and III are correct
c) II, III and IV are correct
d) All are correct

406. Prokaryotic ribosome has sedimentation coefficient of
a) 80S b) 70S c) 40S d) 60S

407. The plasmid DNA confers certain unique characters to bacteria in which they are found. This include
I. resistance to antibiotics
II. no resistance to antibiotics
III. monitor bacterial transformation with foreign DNA
The correct option is
a) Only I b) Only II c) I and III d) II and III

408. The cell as a basic unit of structure of living things was discovered by
a) Aristotle b) Robert Hooke
c) Schleiden and Schwann d) Gregor Mendel

409. What is the common between chloroplasts, chromoplasts and leucoplasts?
a) Presence of pigments b) Possession of thylakoids and grana
c) Storage of starch, proteins and lipids d) Ability to multiply by a fission-like process

410. Wall of eukaryotic cell (fungus) is made up of a polymer of
a) α, 1-4 acetyl glucosamine b) β, 1-4 acetyl glucosamine
c) α, β, 1-4 acetyl glucosamine d) Acetyl glucosamine

411. Suicidal bags are
a) Lysosomes b) Golgi bodies c) Ribosomes d) Chloroplast

412. An analysis of a DNA (double strandard) sample yielded 18% cytosine. What would be the percentage of other bases in this sample?
a) T- 32%, A-32%, G-18% b) T-32%, A-18 %, G-32%
c) T-18%, A-32%, G-32% d) T-40%, A-22%, G-20%

413. Which of the following is not a function of vacuole in plant cell?
a) Storage b) Waste disposal
c) Cell elongation and protection d) Production of the hydrogen peroxide

414. Inner membrane of mitochondria forms
a) Cisternae b) Cristae c) Thylakoids d) Lamellae

415. Plasma membrane is made up of
a) Lipid, protein and water b) Lipid, protein and manganese
c) Lipid and carbohydrate d) Lipid, protein and carbohydrates

416. The diameter of Z-DNA is
a) 34Å b) 20Å c) 18Å d) 45Å

417. Many bacteria have small circular DNA outside the genomic DNA. These smaller DNA are called
a) Plasmids b) Mesosome c) Nucleoid d) None of these

418. Glyoxylate cycle occurs in
a) Lysosomes b) Ribosomes c) Glyoxysomes d) Peroxisomes

419. A conspicuous rounded body present in nucleoplasm and attached to a particular chromosome at a definite place is
a) Plasmid b) Karyolymph c) Nucleolus d) Nuclear reticulum

420. During replication of a bacterial chromosome, DNA synthesis starts from a replication origin site and
a) RNA primers are involved b) Is facilitated by telomerase
c) Moves in one direction of the site d) Moves in bi-directional way

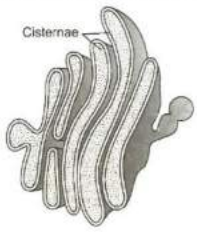
421. Nucleotide consists of
a) Phosphate only b) Phosphate and sugar only
c) Phosphate, sugar and nitrogen base d) Phosphate and nitrogen base only

422. The 'Power house' of cell is
a) Mitochondria b) Lysosome c) Ribosome d) Golgi complex

423. Bacterial flagellum consists of all of the following components except
a) Microtubule b) Filament c) Basal body d) Hook

424. Middle lamella is mainly composed of
a) Hemicellulose b) Muramic acid c) Calcium pectate d) Phosphoglycerides

425. Identify the given figure



a) RER b) SER c) GB d) None of these

426. RNA is not found in
a) Chromosome b) Plasmalemma c) Nucleolus d) Ribosome

427. Two animal cells are interconnected by
a) Plasmodesmata b) Cell Wall c) Desmosome d) Plasma membrane

428. One of the nucleotides of DNA is
a) Adenine
b) Deoxyadenylic acid
c) Adenosine
d) Deoxyuridine phosphate

429. Golgi apparatus
I. transports and modifies material.
II. Secrete mucin in respiratory tract.
III. Secretes slime in insectivorous plants
What is correct?
a) I is incorrect, but II and III are correct b) II is incorrect, but I and III are correct
c) II and III are incorrect but I is correct d) None incorrect all correct

430. If an isolated strain of DNA is kept at 80-90°C, then,
a) It changes into RNA b) It breaks into two fragments
c) It breaks into many fragments d) It uncoils and the two strands separate

431. Which one of the following structures between two adjacent cells is an effective transport pathway?
a) Plasmodesmata b) Plastoquinones
c) Endoplasmic reticulum d) Plasmalemma

432. Coupling factor 'F' is found in
a) Stroma b) Matrix c) Thylakoids d) Ribosomes

433. Which of the following enzymes helps in crossing plasma membrane?
a) Protease b) Pepsin c) Dehydrogenase d) Permease

434. Which one is referred to as soluble RNA?
a) mRNA b) tRNA c) rRNA d) ssRNA

435. Which of the following is not true for a eukaryotic cell?
a) It has 80S type of ribosome present in the mitochondria
b) It has 80S type of ribosome present in the cytoplasm
c) Mitochondria contains circular DNA
d) Membrane bound organelles are present

436. Secondary cell wall grows by
a) Deamination b) Calcicole c) Apposition d) None of these

437. Fat is stored in the plant cell in
a) Lysosome b) Spherosome c) Microsome d) Peroxisome

438. If a DNA sequence is same as that of a mRNA copy that is translated into protein, it is called
a) Sense b) Antisense c) Intron d) Exon

439. Read the following statements and select correct options for prokaryotic cells

I. They are generally smaller than eukaryotic cells
II. They multiply more rapidly than the eukaryotic cells
III. They are presented by bacteria, BGA mycoplasma and PPLO (Pleura Pneumonia Like Organism)

a) II and I b) II and III c) I and III d) I, II and III

440. Which of the following are properties of reserved cells?
a) They are differentiated and they have capacity of cell division
b) They are undifferentiated and they do not have capacity of cell division
c) They are differentiated and they do not have capacity of cell division
d) They are undifferentiated and they have capacity of cell division

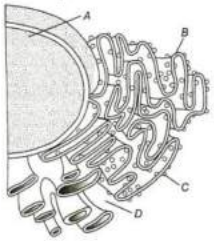
441. The thylakoid in chloroplast are arranged as

a) Interconnected disc b) Interconnected sacs c) Stacked discs d) None of these

442. Consider the following statements and choose the correct options
I. The endomembrane system includes plasma membrane, ER, Golgi complex, lysosomes and vacuoles
II. ER helps in the transport of substances, synthesis of proteins, lipoproteins and glycogen
III. Ribosomes are involved in protein synthesis
IV. Mitochondria helps in oxidative phosphorylation and generation of ATP

a) II, III and IV b) Only I c) Only II d) Only III

443. Identify the components labelled A, B, C, D and E in the diagram given below from the list I to VIII given along with it



Components
I. Cristae of mitochondria
II. Inner membrane of mitochondria
III. Cytoplasm
IV. Smooth endoplasmic reticulum
V. Rough endoplasmic reticulum
VI. Mitochondrial matrix
VII. Ribosome
VIII. Nucleus
The correct components are

A B C D E

a) VIII V VII III IV b) I IV VII VI III c) VI V IV VII I d) V I I II IV

444. Membrane that covers the vacuole in a plant cell is called

a) Tonoplast b) Tonoplasm c) Jacket d) Cell membrane

445. Read the given statements and select the correct option
I. In Golgi complex, the cisternae have *cis* face and *trans* face
II. The *cis* face and *trans* face of Golgi complex are called forming face and maturing face respectively
a) Statement I is correct and statement II is incorrect
b) Both statements are incorrect
c) Both are correct but statement II is the correct explanation of statement I
d) Both are correct, but statement II is not the correct explanation of statement I

446. How many binding sites does ribosome have for tRNA molecules?

a) Two b) Three c) Four d) None of these

447. Which of the following is structural subunit of DNA?

a) Protein b) Carbohydrate c) RNA d) Nucleotides

448. Most prokaryotic cells, mainly the bacterial cells, have
a) A chemically complex cell envelope
b) A chemically simple cell envelope
c) Cell envelope only in the form of a cell membrane
d) No cell envelope

449. Which one of the following organelles is not surrounded by any membrane?
a) Mitochondrion b) Vacuole
c) Endoplasmic reticulum d) ribosome

450. Read the statements given below with regard to the functions performed by Golgi apparatus?
I. Transport and chemically modify the materials contained within it
II. Secrete mucin in the respiratory tract.
III. Secrete slime in the insectivorous plants.
Which of the following is the correct answer?
a) I is wrong but II and III are correct b) II is wrong but I and III are correct
c) II and III are wrong but I is correct d) All are correct

451. Which of the following differentiate plant cells from animal cells?
a) Large vacuole, plastid and cell wall b) Cell wall, plastid and centriole
c) Cell wall, plastid and mitochondria d) Cell membrane, plastid and cell wall

452. The types of ribosome found in prokaryote is
a) 100 S b) 80 S c) 60 S d) 70 S

453. The maximum amount of calcium pectate is present in
a) Primary cell wall b) Secondary cell wall c) Middle lamella d) Cell membrane

454. DNA is present in
a) Chromosomes and dictyosomes b) Chloroplasts and lysosomes
c) Mitochondria and chloroplasts d) Mitochondria and endoplasmic reticulum

455. Subunits of 80 S ribosome are
a) 40 S b) 60 S c) Both (a) and (b) d) None of these

456. 'It has not escaped our notice that the specific pairing we have postulated immediately suggests a possible copying mechanism for the genetic material'. This is written by
a) Meselson and Stahl b) Archibold Garrod c) Severo Ochoa d) Watson and Crick

457. Clover leaf secondary structure of *t*RNA has anticodon arm which
a) Contains in its loop three nucleotides of the codon
b) Contains in its loop three nucleotides of the anticodon
c) Contains in its no nucleotides
d) Both (a) and (b)

458. Which of the following statements are correct for eukaryotic cells?
I. Two envelope organisation
II. The flagella if present, are 11 stranded with differentiation of axonema and sheath
III. Organised nucleus
IV. Cell wall without muramic acid
Choose the correct option
a) I and II b) I and III c) Only IV d) I, II, III and IV

459. A nucleoid represents the genetic material of prokaryotes. It is known as
a) Prochromosome b) Genophore c) Incipient nucleus d) All of these

460. Nucleic acid occurs in
a) Golgi body b) Lysosomes
c) Cytoplasm d) Mitochondria and chloroplast

461. Assembly of two subunits 40 S and 60 S of the ribosome is
a) 100 S b) 80 S c) 70 S d) 50 S

462. Flagella of prokaryotic and eukaryotic cells differ in
a) Type of movement and placement in cell
b) Location in cell and mode of functioning
c) Micro-tubular organisation and type of movement
d) Micro-tubular organisation and function

463. DNA replication includes
a) DNA ligase
b) DNA polymerase and ligase
c) RNA polymerase
d) All of the above

464. Mesosomes are the infoldings of cells membrane, which
I. helps in cell wall formation, DNA replication and respiration
II. increases the surface area of plasma membrane
III. are present in both prokaryotic and eukaryotic cells
Choose the correct option
a) II and III
b) I and II
c) I and III
d) I, II and III

465. The cell organelle associated with intracellular digestion of macromolecules is
a) Lysosome
b) Peroxisome
c) Polysome
d) Dictyosome

466. According to cell doctrine, which of the following statements are incorrect?
I. The bodies of all living beings are made up of cells and their products
II. Cells are the basic units of structure in the body of living organisms
III. Cells are the basic units of function in living organisms that is, the activities of an organisms are the sum total of the activities of its cells
IV. Genetic information is stored and expressed inside the cells
Choose the correct option
a) II and III
b) I and II
c) Only I
d) I, II, III and IV

467. Long flattened, usually unbranched units arranged in parallel stacks in endoplasmic reticulum are called
a) Cisternae
b) Cristae
c) Vesicles
d) Tubules

468. Assume that an actively respiring cell has 3x number of K^+ in its cytoplasm and 2x number of K^+ entered into the cell. What is the process by which K^+ transport has taken place?
a) Primary active transport
b) Secondary active transport
c) Diffusion
d) Passive transport

CELL THE UNIT OF LIFE

: ANSWER KEY :

1)	b	2)	c	3)	a	4)	d	169)	b	170)	c	171)	c	172)	c
5)	d	6)	d	7)	b	8)	b	173)	a	174)	a	175)	b	176)	b
9)	d	10)	d	11)	b	12)	a	177)	a	178)	c	179)	c	180)	d
13)	d	14)	c	15)	c	16)	a	181)	b	182)	b	183)	a	184)	d
17)	c	18)	b	19)	b	20)	b	185)	b	186)	b	187)	b	188)	b
21)	a	22)	a	23)	d	24)	d	189)	c	190)	d	191)	d	192)	c
25)	b	26)	d	27)	a	28)	d	193)	b	194)	a	195)	d	196)	a
29)	d	30)	d	31)	c	32)	c	197)	b	198)	c	199)	c	200)	b
33)	c	34)	b	35)	a	36)	c	201)	d	202)	d	203)	c	204)	b
37)	b	38)	c	39)	b	40)	a	205)	a	206)	c	207)	a	208)	c
41)	b	42)	b	43)	c	44)	c	209)	d	210)	a	211)	b	212)	c
45)	b	46)	a	47)	b	48)	d	213)	a	214)	b	215)	c	216)	d
49)	d	50)	b	51)	d	52)	d	217)	a	218)	b	219)	a	220)	b
53)	b	54)	a	55)	c	56)	c	221)	c	222)	d	223)	c	224)	b
57)	b	58)	a	59)	d	60)	c	225)	b	226)	a	227)	d	228)	a
61)	b	62)	b	63)	a	64)	a	229)	d	230)	a	231)	b	232)	a
65)	d	66)	b	67)	c	68)	d	233)	c	234)	b	235)	c	236)	a
69)	a	70)	b	71)	c	72)	b	237)	b	238)	a	239)	a	240)	b
73)	b	74)	d	75)	c	76)	b	241)	a	242)	d	243)	a	244)	d
77)	d	78)	a	79)	c	80)	a	245)	b	246)	c	247)	d	248)	a
81)	a	82)	b	83)	a	84)	d	249)	b	250)	a	251)	c	252)	c
85)	c	86)	d	87)	d	88)	d	253)	d	254)	c	255)	d	256)	b
89)	a	90)	c	91)	c	92)	b	257)	d	258)	a	259)	b	260)	a
93)	a	94)	a	95)	c	96)	a	261)	b	262)	b	263)	c	264)	c
97)	d	98)	a	99)	b	100)	c	265)	b	266)	d	267)	c	268)	a
101)	a	102)	b	103)	d	104)	d	269)	a	270)	a	271)	d	272)	b
105)	c	106)	c	107)	b	108)	c	273)	b	274)	c	275)	a	276)	a
109)	a	110)	c	111)	a	112)	c	277)	a	278)	a	279)	a	280)	a
113)	d	114)	a	115)	b	116)	d	281)	d	282)	c	283)	c	284)	a
117)	a	118)	d	119)	c	120)	b	285)	b	286)	d	287)	b	288)	d
121)	d	122)	c	123)	b	124)	c	289)	c	290)	b	291)	b	292)	c
125)	b	126)	d	127)	d	128)	b	293)	b	294)	d	295)	c	296)	b
129)	a	130)	b	131)	a	132)	c	297)	c	298)	a	299)	a	300)	a
133)	a	134)	c	135)	b	136)	b	301)	c	302)	a	303)	d	304)	a
137)	b	138)	b	139)	d	140)	a	305)	b	306)	a	307)	d	308)	b
141)	d	142)	c	143)	d	144)	a	309)	a	310)	a	311)	c	312)	d
145)	a	146)	b	147)	d	148)	a	313)	c	314)	c	315)	b	316)	c
149)	c	150)	d	151)	b	152)	d	317)	d	318)	d	319)	b	320)	b
153)	b	154)	a	155)	a	156)	a	321)	b	322)	d	323)	c	324)	c
157)	c	158)	d	159)	a	160)	b	325)	d	326)	b	327)	b	328)	b
161)	a	162)	d	163)	a	164)	a	329)	d	330)	c	331)	c	332)	b
165)	a	166)	a	167)	a	168)	a	333)	c	334)	a	335)	b	336)	d

337) c	338) c	339) b	340) d	405) d	406) b	407) a	408) b
341) c	342) b	343) d	344) d	409) c	410) b	411) a	412) a
345) b	346) d	347) b	348) c	413) d	414) b	415) d	416) c
349) b	350) b	351) d	352) b	417) a	418) c	419) c	420) a
353) d	354) a	355) d	356) d	421) c	422) a	423) a	424) c
357) a	358) b	359) c	360) d	425) c	426) b	427) c	428) b
361) d	362) d	363) d	364) a	429) d	430) d	431) a	432) c
365) a	366) a	367) a	368) c	433) d	434) b	435) a	436) c
369) b	370) a	371) c	372) b	437) b	438) a	439) d	440) d
373) c	374) d	375) b	376) d	441) c	442) a	443) a	444) a
377) c	378) d	379) b	380) b	445) d	446) a	447) d	448) a
381) c	382) d	383) b	384) b	449) d	450) d	451) a	452) d
385) c	386) a	387) b	388) c	453) c	454) c	455) c	456) d
389) d	390) d	391) c	392) a	457) b	458) d	459) d	460) d
393) c	394) c	395) d	396) a	461) b	462) c	463) d	464) b
397) a	398) d	399) c	400) a	465) a	466) d	467) a	468) b
401) d	402) b	403) d	404) c				

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: HINTS AND SOLUTIONS :

1 **(b)**
Nucleosome is sub-microscopic sub-unit of chromatin which is formed by wrapping of DNA over a core of histone proteins. The term was coined by Oudet *et. al..*, (1975). It is oblate structure with a length of 10nm and a thickness of 5-5.7nm. Its core is called nu-body. The latter is formed of four pairs of histone molecules H_2, A, H_2B, H_3 andH_4. DNA makes 1.75 turns over the octamer to form a nucleosome. Two adjacent nucleosomes are connected by a short segment of unboud DNA called linker DNA. A fifth type of histone called $H_1$is attached over the linker DNA. Nucleosomes appear as 'beads-on-string' in the chromosomes under electron microscope.

2 **(c)**
In 1953, **James Watson** and **Francis Crick** suggested that in a DNA molecule there are two polynucleotide chains arranged **antiparallel** or in opposite directions.

3 **(a)**
Centrosome is an organelle containing two cylindrical structures called centrioles and occurs in most algal cells (except red algae) and most animal cells. They are absent in prokaryotes, red algae, yeast, gymnosperms and angiosperms and some non-flagellated or non-ciliated protozoans.

4 **(d)**
There are two major classes of membrane transport proteins carrier proteins and channel proteins. Carrier proteins involved with active as well as passive transport of ions or solutes while channel proteins are involved only with passive transport.

5 **(d)**
Normally, the primary constriction is known as kinetochore. In some cases, chromosome contains non-staining secondary constriction called satellite

6 **(d)**
The ciliary microtubules are made up of tubulin. The two subfibres A and B are composed of α and β tubulin having mol. Wt. 56,000 and 58,000 respectively.

7 **(b)**
On the inner side of the thylakoid membranes of chloroplasts are present a paracrystalline array of particles (20×10 nm); these were called quantosomes by Park and Pon (1963).

8 **(b)**
Glyoxysomes were reported from the endosperm of germinating seeds, rich in fatty acids, by **Beevers** (1969). They serve as enzymatic site for reactions including the conversion of stored fatty acids to carbohydrate. Therefore, glyoxysomes will be present in endosperm of castor but not in endosperm of wheat, which is carbohydrate rich.

9 **(d)**
Nucleolus, ribosomes and centrioles are non-membranous cell organelles.

10 **(d)**
Single stranded DNA virus: Bacteriophage $\phi \times$ 174, coliphage S 13, bacteriophage M13.

11 **(b)**
Besides DNA, a mitochondrion has RNA and its ribosomes also. Thus, a complete protein synthesising machinery is present in mitochondria. The ribosomes of mitochondria are small, *i. e.*, 55-60 S type, with a large subunit of 40 S and a small subunit of 30 S. The large subunit contain 16-17 S and 5S *r*RNA and the small subunit 12-13 S *r*RNA.

12 **(a)**
Microtubules are electron microscopic structures found only in the eukaryotic cellular structures like cilia, flagella, centriole, etc. The wall of microtubule is 50Å thick, which is formed of 13 parallel prototubules.

13 **(d)**
Ribosomes are granular structures, first observed under electron microscope as dense particles by George Palade (1953)

14 **(c)**

Middle lamella is a thin binding layer between the cell wall of adjacent plant cells. It is chemically formed of pectates of calcium and magnesium. It is present towards outside of primary wall.

15 **(c)**

Rough Endoplasmic Reticulum (RER) differs from Smooth Endoplasmic Reticulum (SER) due to presence of ribosomes. Some other difference are as follows:

Character	SER	RER
Origin	Formed from RER by removal of ribosome	Formed from nuclear membrane with attachment of ribosomes
Position	Present near the plasmalemma	Present near the nucleus
Occurrence	Lipid forming cell adipocytes, Leydig's cell of testis, adrenal cortical cells	Protein synthesizing cell pancreatic cell, goblet cell, plasma cell, Nissl's granules
Component	Formed of tubules	Formed of cisternae.
Function	Synthesis of fat, glycogenolysis, detoxification of hepatocytes	Protein and glycoprotein synthesis

16 **(a)**

A widely accepted, improved model of cell membrane is fluid mosaic model

17 **(c)**

The **centrioles** appear as two cylindrical structures. They are formed of microtubules. In higher animals, they form the mitotic pole, *ie*, they are involved in formation of spindle.

18 **(b)**

A-Outer membrane, B-Inner membrane, C-Granum, D-Thylakoid, E-Stroma lamella and F-Stroma

19 **(b)**

Ribosomes are the site of protein synthesis, also called proteins factories. In testes, ovary and adrenal cortex, SER has a role in the synthesis of steroid hormones.

20 **(b)**

The back bone of RNA is made up of ribose sugar (5-carbon), whereas DNA consists of deoxyribose sugar.

21 **(a)**

Chemiosmotic theory of ATP synthesis in the chloroplasts and mitochondria is based on proton gradient.

22 **(a)**

In prokaryotes, ribosome attach to the 5' end of mRNA as soon as transcription begins. A bunch of ribosome moves along a single mRNA molecule adding 15 amino acids/second to the polypeptide chain, almost the same speed at which RNA polymerase transcribes the mRNA.

23 **(d)**

In eukaryotic cell, plasmodesma is lined by plasma membrane. It encloses tubular extension of endoplasmic reticulum called desmotubule

24 **(d)**

I, II, III and IV

25 **(b)**

Endoplasmic Reticulum is a network of interconnected cisternae, tubules and vesicles present in cytoplasm. Depending on presence or absence of ribosomes it is of two types-

(i) **Rough ER :** It has ribosomes attached to its surface by ribophorin

(ii) **Smooth ER:** It does not have ribosomes.

26 **(d)**

A cilium has the appearance of a sharp-pointed straight or curved hair that projects 5-10μm. Many cilia often project from a single cell. The cilium moves forward with a sudden rapid whiplike stroke 10-20 times per second than it moves backward slowly to its original position.

27 **(a)**

DNA polymerase enzyme was discovered by **Kornberg** in 1957 in *E. coli*. There are three polymerases present in *E. coli* namely, polymerase-I, polymerase-II, polymerase-III.

28 **(d)**

Plant cells possess cell wall, plastids and large central vacuole.

Schwan (1839), a British Zoologist, studies different types of animal cells and reported that cells had a thin outer layer. Which is today known as the 'plasma membrane'. Based on his studies on plant tissues, he also concluded that the presence of a cell wall is a unique character of the plant cells. On the basis of this, Schwann proposed the hypothesis that the bodies of animals and plants are composed of cells and its products Scheiden and Schwann together formulated the cell theory. This theory however, did not explain

as to how new cells were formed. Rudolf Virchow (1855) first explained that cells gets divided and new cells are formed from pre-existing cells (*Omnis cellula-e-cellula*)
He modified the hypothesis and Schwann to give the cell theory a final shape. *Cell theory as understood today is*
(i) All living organism are composed of cells and products of cells
(ii) All cells arise from pre-existing cells

29 **(d)**
All the statements are correct

30 **(d)**
Ribosomes are naked ribonucleoprotein protoplasmic particles in which a covering membrane is absent. The ribosomes are of two types, i.e., cytoplasmic and organelle.
The organelle ribosomes are found in plastids and mitochondria. The cytoplasmic ribosomes may remain free in the cytoplasmic matrix or attached to the cytosolic surface of ER with the help of SRP protein.
The bound ribosomes, generally transfer their proteins to cisternae of the ER for their transport to other parts, both inside and outside the cell

31 **(c)**
In prokaryotes, a nucleus is absent but nucleoid is found which is equivalent to a single chromosome or prochromosome

32 **(c)**
In a DNA molecule, a complete line measures 34Å (3.4 nm) with a distance of 3.4Å (0.34nm) between two successive base pairs.

33 **(c)**
J D Watson and F H C Crick (1953) showed that DNA has a double helical structure with two polynucleotide chains connected by hydrogen bonds and running in opposite directions (antiparallel). The antiparallel strands of a DNA molecule means that the phosphate groups at the start of two DNA strands are in opposite position (pole).

34 **(b)**
Steps of Gram's staining technique
(i) Staining with weak alkaline solution of crystal violet
(ii) Treatment with 0.5% iodine solution
(iii) Washing with water
(iv) Treatment with absolute alcohol/acetone

35 **(a)**
In eukaryotes, DNA is tightly bound to histones which form a DNA protein particle called **nucleosome**.

36 **(c)**
The ability to distinguish different neighbouring cells is important for organism's function
Glycolipids are lipids with attached carbohydrate, which acts as recognition sites during cell-cell interaction, as well as sites of attachment in a tissue
Glycoproteins are often integral membrane proteins and are also important for cell recognition

37 **(b)**
DNA multiplication or duplication of DNA takes place by **replication**. It takes place during S-phase of interphase in cell-cycle.

38 **(c)**
70 S ribosomes are found in prokaryotes, *i. e.*, bacteria and blue green algae. The 70 S ribosomes have 2 subunits, *i. e.*, 50 S and 30 S. The ribosomes of mitochondria are small, *i. e.*, 55-60 S type, which are comparable to 70 S than 80 S type.

39 **(b)**
In protoplasm, fat store in the form of **triglycerides.** Polypeptides, polysaccharides and nucleoside are proteins, carbohydrates ad nucleic acid, respectively.

40 **(a)**
Each spindle is a bipolar fibrous structure composed mainly of microtubules. The spindle fibres are mainly composed of tubulin protein.

41 **(b)**
Glycocalyx (mucilage sheath) of a bacterial cell may occur in the form of a loose sheath called I. Slime layer or it may be thick and tough called II. Capsule

42 **(b)**
Rough endoplasmic reticulum contains ribosomes on their surface, which are the site for protein synthesis by the processes of translation in cytoplasm.

43 **(c)**
Small cells have a large surface area per volume ratio as compared to large cells.

44 **(c)**
Unicellular organisms are capable of (i) independent existence, (ii) performing the essential functions of life. Anything less than a complete structure of a cell do not ensure

independent living. Hence, cell is the fundamental structural and functional unit of all living organisms

45 **(b)**
Basic fuchsin is used by **Feulgen** to stain DNA.

46 **(a)**
Out of A-T-, G-C pairing, bases of DNA may exist in alternate valency state owing to arrangement called tautomerisational mutation. It involves presence of tautomeric forms of nitrogen bases, *e. g.*, imino tautomer instead of amino group (*i. e.*, cytosine-adenine) or enol group instead of keto group (*i. e.*, thymine-guanine).

47 **(b)**
Cell is a unit of structure and function of an organism. Term 'Cell' was coined by **Robert Hooke** in 1665.

48 **(d)**
Okazaki fragments are produced during DNA synthesis.

49 **(d)**
Cellulose $(C_6H_{10}O_5)_n$ is the most abundant organic polymer. It is a polysaccharide and consists of long unbranched chains of glucose residues linked by β, 1-4 glycosidic bonds.

50 **(b)**
Motality of eukaryotic flagella is dependent upon ATPase activity. Enzyme **asconic dynein** catalyses ATP activity.

51 **(d)**
During DNA replication, there occur a simultaneous continuous synthesis of DNA at both the strands of template in 5' →3' direction of newly synthesised strand.
Okazaki *et. al*, (1968) suggested that it is only one strand, which shows such a continuous replication (called leading strand), while other strand replicates in a discontinuous manner, *i. e.*, synthesises short fragments called **Okazaki fragments**. This discontinuous strand is called lagging strand.

52 **(d)**
According to Chargaff's rule, in DNA, the proportion of adenine always equals to that of thymine and proportion of guanine always equal to that of cytosine, *i. e.*, A=T and G=C. Thus, in a DNA, if guanine is 20%, cytosine also will be 20%. So, both adenine and thymine together will be 60%, *i. e.*, 30% adenine and 30% thymine.

53 **(b)**
Protoplasm is a complex, granular, elastic viscous, colourless fluid-like substance, which is selectively permeable.
J Huxley defined it as **'Physical basis of life'.**
Dujardin discovered it and called **'Sarcode'.**
Purkinje renamed it as **Protoplasm.**

54 **(a)**
Antony von Leeuwenhoek first saw and described a living cell. Robert Brown later discovered the nucleus

55 **(c)**
Primary lysosomes are formed either directly from ER (endoplasmic reticulum) of indirectly from Golgi complex. Generally, hydrolytic enzymes are synthesised first by ribosomes and then transferred to ER. From ER, these are conveyed to Golgi complex through blebbing. Golgi complex then gives birth to lysosomes through blebbing in itself.

56 **(c)**
Bacteriophage experiment was conducted by Hershey and Chase, (1952). They selected T_2 type phages for experimentation. From this experiment, they conclude that only DNA (and not proteins) pass from one generation to another.

57 **(b)**
In eukaryotic cells, DNA accommodated by super-coiling in nucleosomes.

58 **(a)**
The bases in DNA can interact *via* hydrogen bonds. This base pairing stabilises the three dimensional structure of DNA (*i. e.*, diameter of DNA also).

59 **(d)**
Nucleic acids are of two types, *i. e.*, DNA and RNA. RNA. DNA contains deoxyribose sugar (5 carbon),while RNA contains ribose sugar (5 carbon).

60 **(c)**
Kingdom-Monera have prokaryotic organisation, *E. coli* is a prokaryote and *paramecium* is a eukaryote

61 **(b)**
In prokaryotic cell, DNA is naked, that is, without histones. DNA is usually circular. In addition to the genomic DNA, many bacteria have small circular DNA outside the genomic DNA. These are called plasmids

62 **(b)**

Golgi body originates from endoplasmic reticulum.

64 **(a)**
In bacteria (prokaryote), on the plasma membrane generally at mid point, there are present some circular coiled bodies called **mesosomes,** which contain respiratory enzymes like oxidases, dehydrogenase and hence, they help in respiration.

65 **(d)**
A biomembrane consist of lipids (20-79%) proteins (20-70%), carbohydrates (1-5%) and water (20%)
The lipid molecules are amphiatic or amphipathic, that is, they possess both polar hydrophilic (water loving) and non-polar hydrophobic (water repelling) ends

66 **(b)**
The **microfilaments** are formed mainly of protein actin. They have a role in cell motion, intracellular movements, changes in cell shape, cleavage and muscle contraction.

67 **(c)**
Viruses are an exception to cell theory. Viruses are acellular and do not have a cellular machinery. Even then they are considered to be organisms

68 **(d)**
Cell membrane (plasmalemma) is composed of proteins, lipids and some amount of carbohydrate. Membrane lipid is primarily phospholipid. It contain both polar and non-polar portion.

69 **(a)**
Quantasomes are the photosynthetic units present in the thylakoids of chloroplast. Each of the quantasomes contain about 250-300 chlorophyll molecules.

70 **(b)**
The chemical substances found most abundantly in the middle lamella are released into the phragmoplast by Golgi complex. The Golgi complex synthesises polysaccharides which bring about formation of a cell plate between daughter nuclei during cytokinesis.

71 **(c)**
According to fluid mosaic model, proteins cannot undergo flip-flop movements in the lipid bilayer.

72 **(b)**
Enzyme **DNA ligase** joins the Okazaki fragments in correct sequence, during DNA replication.

73 **(b)**
Lysosomes are the single membrane bound cell organelles, which contain hydrolytic enzymes. These are also known as suicidal bags.

74 **(d)**
Unicellular organisms are capable of (i) independent existence, (ii) performing the essential functions of life. Anything less than a complete structure of a cell do not ensure independent living. Hence, cell is the fundamental structural and functional unit of all living organisms

75 **(c)**
A mitochondria that has its outer membrane removed is called mitoplast.

76 **(b)**
The actual values of sedimentation coefficients of eukaryotic ribosomes is 79-80S in fungi and 80S in mammals. The sedimentation coefficient of two subunits are 40S (small) and 60S (large)

77 **(d)**
Cell membrane is composed of lipids mainly. Later biochemical investigation clearly revealed that the cell membranes also possess protein and carbohydrate

78 **(a)**
Sigma factor is related to RNA polymerase.

79 **(c)**
The figures of cork cells as seen by Robert Hooke were published in the book *Micrographia*

80 **(a)**
Robert Hooke coined the term 'cell' (1665). He thought about the cells, as something similar to veins and arteries of animals, and are filled with juices in living plants.

81 **(a)**
Nucleolus is one of the most important site of RNA synthesis. The RNA synthesised by it is *r*RNA. Which comprises about 80% of total RNA content of the cell.

82 **(b)**
Plasmalemma is also called call membrane or biomembrane that does not contain RNA.

83 **(a)**
A-Telocentric chromosome, B-Acrocentric chromosome, C-Submetacentric chromosome, D-Metacentric chromosome

84 **(d)**

Prokaryotes are generally smaller and differ from eukaryotic cells in terms of structural elements and genetic processes,
e. g., bacteria, blue-green algae, mycoplasma, etc.
Unlike eukaryotes, prokaryotes lack a true nucleus, a nuclear membrane and the membrane bound organelles (mitochondria, chloroplast, Golgi bodies, ER).
Ribosomes are 70 S type in prokaryotes, while it is 80 S in eukaryotes although 70 S type of ribosomes are found in mitochondria and chloroplast of eukaryotic cell.

85 **(c)**
Schleiden (1838) proposed a hypothesis that cell is the structural and functional unit of life.

86 **(d)**
In DNA molecule, instead of **uracil, thymine** is present. Uracil is present in RNA molecule.

87 **(d)**
Prosthetic groups are organic compounds and are distinguished from other co-factors (non-protein constituents bound to the enzymes) in that they are tightly bound to the apoenzyme (protein portion of the enzymes). For example, in peroxidase and catalase, which catalyze the breakdown of H_2O_2 to H_2O and O_2, haeme is the prosthetic group and it is the part of active site of the enzyme.

88 **(d)**
Some prokaryotes like photosynthetic bacteria and blue-green algae posses small membrane lined chromatophores, which are similar to but chemically simpler than the chlorophyll of plants.

89 **(a)**
Heterogenous nuclear RNA (hn RNA) undergo two additional processing known as **capping** and **tailing**. In **capping** an unusual nucleotide (methyl guanosine triphosphate) is added to the 5' end of hnRNA. In **tailing**, adenylate residues (200-300) are added a 3' end in template independent manner.
In **splicing**, introns are removed and exons are joined in a definite order.

90 **(c)**
In prokaryotes, an organelle like the one in eukaryotic cells is ribosomes

91 **(c)**
*t*RNA is synthesised in nucleus and transfers to cytoplasm. It keeps up amino acid to its CCA 3' end and transfers it to ribosome during translation process.

92 **(b)**
Protoplasm of a cell is called protoplast

93 **(a)**
Ribosomes are large non-membranous RNA protein complexes, which are necessary for protein synthesis.

94 **(a)**
Structurally, the mitochondria is bounded by two membranes, *i. e.*, the outer and the inner membrane, separated by a space called outer chamber or inter membrane space. The inner membrane is thrown up into a series of folds called cristae.

95 **(c)**
Bacterial cell envelope consists of three components glycocalyx, cell wall and cell membrane
Glycocalyx It is the outermert mucilage layer of the cell envelope
Cell Wall It is rigid solid covering, which provides shape and structural support to the cell. Cell wall lies between plasma membrane and glycocalyx
Plasma/Cell Membrane It is selectively permeable covering of the cytoplasm that forms the innermost components of cell envelope

96 **(a)**
(i) Ostrich egg – 170 × 150 µm
(ii) Mycoplasma – 01 – 0.5 µm
(iii) Bacteria – 3 - 5 µm
(iv) Human RBCs – 7 µm
So, the arrangement in ascending order is
Mycoplasma → Bacteria → Human RBCs → Ostrich egg

97 **(d)**
A eukaryotic cell is the one which has an organised nucleus and several membrane covered cell organelles.
Except Monera, the cells of all other kingdoms have eukaryotic organisation

98 **(a)**
DNA ligase joins DNA fragments.

99 **(b)**
Each species has a characteristic content of DNA, which is constant in all the individuals of that species and has thus been called the **C-value.**
Eukaryotes vary greatly in DNA content but always contain much more DNA than prokaryotes. Lower eukaryotes have less DNA such as

nematode *Caenorhabditis elegans*, which has only 20 times more DNA then *E. coli* or the *Drosophila*, which has 40 times more DNA (*ie.*, 0.18 pg). Man has about 3.2×10^9bp of DNA per haploid genome. This huge variation in C-value between species is called **C-value paradox.**

100 **(c)**
In fluid mosaic model of plasma membrane, phospholipids form a bimolecular layer in the middle part.

101 **(a)**
According to Watson and Crick's DNA model, DNA exists as double helix in which two polynucleotide chains are coiled about one another in a spiral way (a right handed spiral). The base pairs in DNA are stacked 3.4Å apart with 10 base pairs in a turn (360°) on the double helix. Therefore, if the length of DNA has 45,000 base pairs, DNA molecule will take 4,500 complete turns.

102 **(b)**
One turn of helix measures 34Å. It contains 10 base pairs placed at regular interval of 3.4Å.

103 **(d)**
Plastids are mainly of two types:
(i) Coloured (including chromoplasts containing pigments other than chlorophyll and chloroplast containing green pigment chlorophyll).
(ii) **Leucoplasts**, which store reserve food material, these are devoid of any pigment and may be carbohydrate storing amyloplast, lipid storing elaioplast or protein storing proteinoplast **(aleuroplast)**.

104 **(d)**
The Watson and Crick model shows that DNA is a double helix with deoxyribose sugar-phosphate back bone on the outside and paired bases on the inside. The planes of the bases are perpendicular to the helix axis. The planes of sugars are nearly right angles to those of the bases.

105 **(c)**
RNA has two purines (adenine and guanine) and two pyrimidines (uracil and cytosine) bases. Thymine is not present in RNA, instead of it, uracil is present.

106 **(c)**
A-Plasma membrane, B-Interdoublet bridge, C-Central microtubule and D-Radial spoke

107 **(b)**
The lysosomes are bound by a single unit membrane of 75Å. The peroxisomes are also surrounded by a single unit membrane of about 60Å thickness. The mitochondria is surrounded by double layered membrane.

108 **(c)**
Red colour of tomato is due to presence of lycopene pigment.

109 **(a)**
DNA has deoxyribose pentose sugar and four nitrogenous bases, *i. e.*, adenine (A), guanine (G), both purines and cytosine(C), thymine (T) both pyrimidines. While, RNA has ribose pentose sugar and four nitrogenous bases as in DNA except uracil (U) in place of thymine.

110 **(c)**
(i) The structure replicates during mitosis and generates the spindle – L
(ii) Major site for synthesis of lipid – B
(iii) Power house of the cell – H
(iv) Store house of digestive enzyme – J
(v) Increase the surface area for the absorption materials – N
(vi) Site of glycolysis – F
(vii) Site for active ribosomal RNA synthesis – D

111 **(a)**
Cell membrane was discovered by Schwann (1838) but it was named by Nageli and Cramer (1855)

112 **(c)**
Vacuole is a single membrane bound space in plant cell. It contains cell sap. The cell sap have minerals dissolved in water. It also contains a water soluble pigment anthocyanin. DNA is absent here.

113 **(d)**
The primary cell wall contains many small openings or pores situated in primary pit fields. The cytoplasm of adjacent cells communicates through the pores by means of cytoplasmic bridges called **plasmodesmata**. The plasmodesmata permit circulation of fluids and passage of solutes between cells.

114 **(a)**
A growing cell undergoes a cell cycle that consist essentially of two periods interphase and mitotic phase. Interphase is the period which cells prepare for cell division by synthesising RNA and protein (in G_1 and G_2 – phase) and DNA (in S – phase). Thus, if cell has twice as much DNA as in a normal functional cell, it means that the cell is preparing to divide.

115 **(b)**
Within the nucleus, DNA is organised along with proteins into material called **chromatin** and thick condensed chromatin is called chromosome.

116 **(d)**
Ultra violet rays are high energy radiation, which breaks hydrogen bonds between DNA strands.

117 **(a)**
Double membranes are absent in lysosomes. They are enclosed by lipoproteinaceous unit membrane. Lysosome is called 'suicidal bag' of the cell due to presence of hydrolytic enzymes.

118 **(d)**
Plasmodesmata (singular-plasmodesma) are cytoplasmic bridges between adjacent plant cells. Various substances can pass from one cell to another through plasmodesmata. This term is given by Strasburger in 1901.

119 **(c)**
Pilli are not involved in locomotion. Actually, pilli are longer, fewer and thicker tubular outgrowths, which develop in response to F^+ or fertility factor in gram negative bacteria

120 **(b)**
Endoplasmic reticulum consists of complex membranous system in the cytoplasm of eukaryotic cells. The ER having ribosomes on its surface is called **Rough Endoplasmic Reticulum** while the ER without ribosomes is called smooth ER.

121 **(d)**
There are found total five nitrogenous bases in nucleic acids. Out of these **adenine**, **guanine** (purines) and **cytosine, thymine** (pyrimidines) are present in DNA, while RNA contains uracil in place of **thymine** (both pyrimidines) along with rest 3 similar to DNA.

122 **(c)**
Magnesium is required in united ribosomal subunits, in leaves, growing areas of root and stem protein synthesis hence, withdrawn from ageing.

123 **(b)**
Study of form, structure and composition of cells is called Cytology

124 **(c)**
Lysosomes are the organelles which contain acid hydrolases. All the enzymes do not occur in the same lysosome but there are different sets of enzymes in different types of lysosomes.

125 **(b)**
The smooth endoplasmic reticulum produces nearly all of the lipids required for the elaboration of new cell membranes, including both phospholipids and cholesterol. The major phospholipid is made up of phosphatidylcholine also called **lecithin.**
Lecithin maintains continuity between the water and lipid phases inside and outside the cell.

126 **(d)**
The cytoplasm of all eukaryotic cells is criss-crossed by a network of protein fibres that support the shape of the cell and anchor organelles to fixed locations. It is a dynamic system with three types of fibres – actin filaments, microtubule and intermediate filament.

128 **(b)**
Plant cell wall is mainly composed of cellulose. Other ingredients lignin, cutin, suberin, silica, minerals (*e. g.*, iron, calcium, carbonate) waxes, tannins, resins, gum, etc.

129 **(a)**
As per fluid mosaic model of plasma membrane, the cell membrane consists of a highly viscous fluid matrix of two layers phospholipid molecules. Ribosome mainly consists of *r*RNA and protein. Chromosome is made up of DNA and basic proteins, whereas nucleolus mainly consists of *r*RNA.

130 **(b)**
Endoplasmic reticulum (ER) is a membranous structure extending from nucleus to plasma membrane within the cytoplasm.

131 **(a)**
Pectin is the filler substance of the matrix of eukaryotic cells

132 **(c)**
In the nucleus, the chromatin material is found, which is as organisation of DNA and proteins. Mitochondria and chloroplast also possess extrachromosomal DNA, while DNA is absent in peroxisomes.

133 **(a)**
The fluidity of membranes in a plant in cold weather may be maintained by increasing the number of phospholipids with unsaturated hydrocarbon tails.

134 **(c)**
Total number of coils in a DNA molecule=10.

We know that total number of nitrogen bases are present in a coil=20 (or 10 pairs).
Thus, total number of nitrogenous base is 200.
Out of these, 30 are adenine thus, according to Chargaff's rule guanine should be 70 in number.

135 **(b)**
Cytology or cell biology is the branch of biology dealing with study of structure and function of a cell.

136 **(b)**
M J Schleiden and **T Schwann** (1838-39) proposed cell theory.

137 **(b)**
Pits present in the wall to plant cell helps to produce a protoplasmic continum, called symplast

138 **(b)**
Ribosomes are chemically composed of RNA and proteins (both occurring approximately in equal proportion). The RNA commonly formed ribosome is *r*RNA.

139 **(d)**
DNA fragments can be rejoined under the appropriate renaturation conditions by using the enzyme **DNA ligase** to reform the missing phosphodiester linkages in each strand.
An exonuclease in an enzyme which degrades nucleic acids from ends, while an endonuclease is an enzyme which degrades nucleic acid by making internal cuts.

140 **(a)**
A – Plasmodesmata
B – Rough Endoplasmic Reticulum
C – Golgi apparatus
D – Mitochondrion
E – Ribosomes

141 **(d)**
Spherosomes are not involved in photorespiration.

142 **(c)**
Leucoplasts are colourless plastids found in storage organs of plants *e. g.*,
Amyloplasr – Store starch
Elaioplast – Store fat
Proteinoplast – Store protein

143 **(d)**
Cytoskeletal structures maintains the shape of the cell and its extensions, regulate orientation and distribution of cell organelles, intracellular transport and movement of cells

144 **(a)**
Vital staining is the staining technique in which structure of living cells are stained either in *vivo* or *in vitro*. Three most widely used stain for this are janus green B, neutral red and methylene blue.

145 **(a)**
Mitoplast is not a plastid. It is mitochondria devoid of outer membrane.

146 **(b)**
Elaioplast store oil.

147 **(d)**
J D Watson and **F H C Crick** gave double helix model of DNA in 1953 and got Nobel Prize in 1962.

148 **(a)**
The inward transport of molecule is called endocytosis. Phagocytosis is a type of endocytosis whereby certain cells and unicellular oganisms are capable of ingesting and digesting solid material. Pinocytosis is a type of endocytosis whereby cells are capable of ingesting liquid food.

149 **(c)**
The base ratio A+T/G+C may vary from one species to another, but is constant for a species. It is rarely equal to one end varies between 0.4 and 1.9.

150 **(d)**
Viruses do not have any living characteristic except replication but replication happens only when living cells are available to assist them. Cell theory is not applicable for viruses.

151 **(b)**
Mitochondria are small granular or filamentous bodies, called 'power house of the cell' because it is associated with cellular respiration and energy generation of cell. These contain ribosomes which are appromitaly equal to 70 S type.

152 **(d)**
Ribosomes are made up of protein and RNA in about equal amounts.

153 **(b)**
Strasburger coined the terms 'cytoplasm' and 'nucleoplasm'.

154 **(a)**
In prokaryotic cell, the genetic material is not organised into nucleus and all the membrane bound organelles (mitochondria, chloroplast, Golgi body, endoplasmic reticulum, lysosomes) are absent. The histone proteins are absent and

therefore, the genetic material is not organised into chromatin.

155 **(a)**
Karyotheca or nuclear envelope or nuclear membrane consists of two membranes, *i. e.*, the outer and inner nuclear membranes, which are separated by a perinuclear space and perforated by pores. The outer membrane is continuous with rough endoplasmic reticulum, while the inner membrane surrounds the nucleoplasm.

156 **(a)**
Protein synthesis is also known as translation. Protein synthesis takes place in ribosomes.

157 **(c)**
Holes in the center of the nuclear pore complex provide the main channel through which water soluble molecules shuttle between the nucleus and cytoplasm. This channel also contains a protein called nucleoplasmin, which faciliatates nucleo-cytoplasm traffic through the pore.

158 **(d)**
The function of ATP synthase in chloroplast and mitochondria is the same.

159 **(a)**
Protoplasm denotes the whole of protoplasm

160 **(b)**
Prokaryotic cells contain 70S type of ribosomes and double stranded, circular naked DNA without histone proteins, *e. g.*, bacteria.

161 **(a)**
A-Centromere, B-Satellite, C-Secondary constriction

162 **(d)**
The two strands run antiparallely, *i. e.*, one strand has phosphodiester linkage in 3′→5′ direction, while other strands has phosphodiester linkage in 5′→3′ direction.

163 **(a)**
Z-DNA is a double helical are structures of DNA. It is a left-handed double helical structure in which the double helix winds to the left in zig-zag pattern. It has a structure that repeats every 2 base pairs.

164 **(a)**
The movement of ions is called flux. The inward movement into the cells is influx and the outward movement is efflux.

165 **(a)**
A-Outer membrane, B-Inner membrane, C-Matrix, D-Inter-membrane space, E-Cristae

166 **(a)**
Centrioles are capable of replication. Centriole replication is coordinated in animals cell with cell division. It occurs in 5 or G_2-phase

167 **(a)**
B-DNA shows 10 nucleotides per turn (coil) of helix, if there are 20 coils then total number of nucleotides is 200 out of which 120 are adenine (equal amount of thymine). So, the number of guanine (equal amount of cytosine) nucleotides is 80. Three hydrogen bonds are present between guanine and cytosine.

168 **(a)**
Protoplasm is generally found in two states, *i. e.*, peripheral gel like ectoplasm and central sol like endoplasm. Protoplasm shows transformation between sol and gel states is made possible through flocculation or coagulation of protoplasm.

169 **(b)**
Nucleolus is a rounded structure present inside nucleus, having rRNA.

170 **(c)**
The process by which cells loose this specialisation is called dedifferentiation

171 **(c)**
In DNA, the nitrogenous bases are adenine, guanine(purines) and cytosine, thymine (pyrimidines) while RNA contains uracil in place of thymine (both pyrimidines) along with rest three similar to that of DNA.

172 **(c)**
Golgi body is cell organelle, which was first discovered by an Italian neurologist **Camillo Golgi** (1898) in nerve cells. The main function of Golgi body is secretion, cell plate formation, cell wall formation and acrosome formation during spermatogenesis.

173 **(a)**
In prokaryotic cells, the genetic material is not organised into nucleus and all the membrane bound organelles are absent. The histone proteins are absent and therefore, the genetic material is not organised into chromatin

174 **(a)**
According to Chargaff's rule, the total amount of adenine released is equal to the total amount of thymine and similarly total amount of cytosine is equal to total amount of guanine, *i. e.*, A=T band C=G. It also states that in natural DNAs, the base

ratio A/T is close to unity and C/G is also close to unity
(A+C+=T+G). Thus, in the given option, except A+T=C+G, all are correct.

175 **(b)**
On the plasma membrane of bacteria generally at mid point, there are present some circular coiled bodies called **mesosomes**. Mesosomes are more prominent in Gram+ve bacteria. Mesosomes receive DNA during conjugation and DNA replication enzyme.

176 **(b)**
Bacterial cell envelope consists of three components glycocalyx, cell wall and cell membrane
Glycocalyx It is the outermert mucilage layer of the cell envelope
Cell Wall It is rigid solid covering, which provides shape and structural support to the cell. Cell wall lies between plasma membrane and glycocalyx
Plasma/Cell Membrane It is selectively permeable covering of the cytoplasm that forms the innermost components of cell envelope

177 **(a)**
*t*RNA has amino acid binding site at the 3' end having CCA codon. It looks like clover leaf in two dimensional structure and have anticodon site on anticodon loop.

178 **(c)**
Endoplasmic reticulum is a network of much branched, elaborate system of membrane bound cavities or lumens extending from nucleus to plasma membrane within the cytoplasm.

179 **(c)**
Mitochondria and **chloroplasts** are the autonomous bodies. In these, small circular DNA particles are present which can duplicate and expressed.

180 **(d)**
All passive cells like eggs are larger in size. Larger cells have lower surface volume ratio. All active cells are smaller. If larger cells has to remain active, they are either cylindrical in shape or possess several extensions of the cell membrane. Microvilli are one of such developments. They are found in all those cells, which are active in absorption. These also occur in transfer cells found in plants

181 **(b)**
Prokaryotic cells are generally smaller and multiply more rapidly than the eukaryotic cells

182 **(b)**
Animal cells contains non-membrane bound organelle called centriole, which helps in cell division

183 **(a)**
In prokaryotes, genetic material is basically naked.
In prokaryotes, additional small circular DNA entities called plasmids are present. Plasmids carry additional specific factors like nitrogen fixation, resistance, fertility, etc. DNA present as genetic material is naked and often called genophore, nuclear body or nucleoid

184 **(d)**
Transfer RNA (*t*RNA) or soluble RNA (*s*RNA) is the smallest (4S) which constitutes about 15% of the total. *t*RNA is also called adapter molecule because it helps in transferring amoni acids to ribosomal sites during polypeptide synthesis.

185 **(b)**
Protein synthesis takes place in ribosomes, which are attached to surface of endoplasmic reticulum by ribophorin-I and ribophorin-II. About 50 hydrolytic enzymes are found in the lysosome. They include proteases, nucleases, glycosidases, lipases phospholipases, phosphatases and sulphatases. All lysosomal enzymes are acid hydrolases and optimally active at pH-5.0.

186 **(b)**
Endoplasmic reticulum (ER) is of two types on the basis of presence or absence of ribosomes.
Rough ER: Ribosomes present, main function is synthesis of proteins.
Smooth ER: Ribosomes absent, main functions are lipid metabolism, detoxification.

187 **(b)**
Mitochondria is rich in catabolic enzymes.

188 **(b)**
DNA gyrase unwinds the DNA strands during DNA replication.

189 **(c)**
Schwan (1839), a British Zoologist, studies different types of animal cells and reported that cells had a thin outer layer. Which is today known as the 'plasma membrane'.
Based on his studies on plant tissues, he also concluded that the presence of a cell wall is a unique character of the plant cells. On the basis of

this, Schwann proposed the hypothesis that the bodies of animals and plants are composed of cells and its products.

Schleiden and Schwann together formulated the cell theory. This theory however, did not explain as to how new cells were formed. Rudolf Virchow (1855) first explained that cells gets divided and new cells are formed from pre-existing cells (*Omnis cellula-e-cellula*).

He modified the hypothesis of Schleiden and Schwann to give the cell theory a final shape. *Cell theory as understood today is*

(i) All living organism are composed of cells and products of cells

(ii) All cells arise from pre-existing cells

190 **(d)**

In eukaryotes, ribosomes are found in chloroplasts and mitochondria. In prokaryotes, ribosomes occur freely in the cytoplasmic matrix In eukaryotic cells, RER possesses ribosomes attached to its membranes

Ribosomes occur in all living cells with the exception of mammalian erythrocytes or red blood corpuscles

191 **(d)**

Cell wall performs a number of functions

Cell wall not only gives shape to the cell and protects the cell from mechanical damage and infections, it also helps in cell to cell interaction and provides barrier to undesirable macromolecules

192 **(c)**

Single membrane cell organelles are known as microbodies *eg*, lysosomes, peroxisomes, glyoxysomes and spherosomes.

193 **(b)**

Middle lamella is a thin binding layer between the cell wall of adjacent plant cell. It is chemically formed of calcium and magnesium pectate.

194 **(a)**

In uniport, molecule moves across a membrane independent of other molecules. In symport, both molecules cross the membrane in the same direction. In antiport, they move in opposite directions.

195 **(d)**

Meselson and **Stahl** (1958) verified the semiconservative nature of DNA replication in a series of elegant experiments using isotopically labelled DNA and a form of isopycnic density gradient centrifugation.

196 **(a)**

Prokaryotes (bacteria and blue-green algae) are the most abundant organisms on earth. A prokaryotic cell does not contain a membrane-bound nucleus. Each prokaryotic cell is surrounded by plasma membrane. There is no subcellular

organelles, only infolding of the plasma membrane called mesosomes and ribosomes are present.

197 **(b)**

The chloroplast is double membrane bound organelle, *i. e.*, an outer and an inner membrane with an inter membrane space that is endored by stroma or stromal space. The stroma contains small cylinders in it, called grana. Each granum consists of disc-shaped membranous sacs, called thylakoids.

198 **(c)**

Ribosomes are present in both Protista and Monera. These are concerned with protein synthesis.

199 **(c)**

Cech *et al*, discovered ribozyme the RNA molecule having enzymutic properties.

200 **(b)**

In 1850, **Kolliker** for the first time seen mitochondria. Later on, **C Bends** coined the term mitochondria. These are the sites of cellular respiration, oxidative phosphorylation, synthesis of haeme protein cytochrome, myoglobin, etc.

201 **(d)**

DNA polymerase is used in DNA multiplication or replication.

202 **(d)**

All the given statements are correct

203 **(c)**

Polyribosomes are aggregation of several ribosomes held together by a string of *m*RNA

204 **(b)**

Prokaryotic ribosome is of 70 S type, which consists of two subunits, a small 30 S subunits and a large 50 S subunit. Eukaryotic ribosome is of 80 S type. It consists of two subunits, a small 40 S subunits and a large 60 S subunit.

205 **(a)**

The plasma membrane consists of glycoproteins. In Golgi bodies, glycosylation of proteins takes

place, *i. e.*, addition of carbohydrate to produce glycoproteins.

206 **(c)**
The centrosome is present in animals and some lower plants such as dinoflagellates, *Euglena* and *Chlamydomonas*, etc. The term centrosome is applied to a pair of centrioles which is also called diplosome.

207 **(a)**
Robert Hooke developed a microscope with which he studied the internal structure of the cell. His work is famous for the study of cork cells

208 **(c)**
The enzyme helicase unwinds the helix (by disrupting H bonds), while topoisomerase breaks and releases tension of strands of DNA. Topoisomerase also takes part in recombination.

209 **(d)**
Cell wall consists of lignin, hemicellulose, pectin and cellulose.

210 **(a)**
Ribosomes are ribonucleoprotein particles. These are the site of protein synthesis. Two basic types of ribosomes are –
70 S type (50S+30S): These are found in prokaryotes, mitochondria and chloroplast.
80S type (60S+40S): these are found in cytoplasm of eukaryotes.

211 **(b)**
In plants translocation of organic solutes takes place by phloem.

212 **(c)**
Flagella of prokaryotic and eukaryotic cells differ in micro tubular organisation and type of movement.

213 **(a)**
Endoplasmic reticulum is a network of 60 nm diameter. The surface of rough endoplasmic reticulum is covered by ribosomes. Ribosomes are the site of protein synthesis.

214 **(b)**
Flip-flop movement is rarely found in molecules, whereas it remain absent in protein molecules.

215 **(c)**
All statements are correct

216 **(d)**
In prokaryotic cell, the ribosomes are 70 S type, nucleus and all the membrane bound cell organelles are absent. The genetic material lies in the middle as **nucleoid.**

217 **(a)**
The mechanism of ciliary movement is not completely under stood. It is known that the microtubules behave as sliding filament that move past one another much like the sliding filaments of vertebrate skeletal muscle. The fluxes of Ca^{2+}across the membrane is not responsible for controlling the organised beating of cilia.

218 **(b)**
Bacterial cells have a chemically complex cell envelope. The cell envelope consists of a tightly bound three-layered structure, *ie.*, the outermost glycocalyx followed by the cell wall and then the plasma membrane. The glycocalyx is made up of sugar and proteins.

219 **(a)**
Cell theory was formulated by Schleiden and Schwann in 1839 in their paper Microscope investigations on the similarity of structure and growth in animals and plants

220 **(b)**
ER is involved in modification and routing of newly synthesised proteins to their destinations.

221 **(c)**
All cells are enclosed by a thin, film-like liable membrane called the plasma membrane or plasmalemma. The main function of plasma membrane is to regulate the flow of materials into and out of the cell (osmoregulation). The membrane is selectively permeable.

222 **(d)**
Golgi complexes or **Golgi bodies** and ER form the endomembranous system of eukaryotic cell. Golgi bodies are made up of various membranous systems, *e. g.*, cisternae, vesicles and vacuoles.

223 **(c)**
Mesosome is the extension of plasma membrane into the cytoplasm
It helps in cell wall formation, DNA replication, respiration, secretion processes, increases the surface area of plasma membrane and enzymatic contents. It also helps in cytokinesis. It is generally found in bacterial cells

224 **(b)**
Solenoid Model (the supra-nucleosomal structure) explains how the nucleosomes are packed into the 200-300 Å thick nucleofilament of chromatin.
Finch and **Klug** (1976) found a close packing of nucleosomes to produce a nucleofilament, a fibre

100Å in diameter. The nucleofilaments (chromatin fibre) is further coiled up to a form of solenoid with a diameter of 300-350Å (30 nm). There are about six nucleosomes per turn of the solenoid coils.

225 **(b)**
DNA strand which is formed continuously in 5' → 3' direction is called leading strand and DNA strand, which is formed in small pieces (*i. e.*, Okazaki fragments) of DNA is called lagging strand.

226 **(a)**
Dictyosome or Golgi complex is present in higher number in secretary cells. All glandular cells depend upon Golgi complex for concentrating and pouring their secretion to the outside.

227 **(d)**
Both RNA and ATP contains five carbon sugar-ribose.

228 **(a)**
In Prokaryotes, if cell wall is present, it possesses muramic acid

229 **(d)**
Escherichia coli is a Gram (−ve) bacteria. *Bacillus subtilis* is a Gram (+ve) bacteria. Washing of the Gram's stain in Gram (−ve) bacteria is due to high lipid content of the cell wall, which gets dissolved in organic solvents like acetone

230 **(a)**
There are large non-membranous RNA protein complexes which are necessary for protein synthesis. There are dense granules of 150 to 200Å diameter (as revealed by electron microscope) and found either in free state or attached to the outside of cytoplasmic membrane just like that of ER or nuclear membrane, etc, through **ribophorins.**

231 **(b)**
Okazaki *et. Al,* (1968) suggested that during DNA replication only one strand shows a continuous replication (leading strand), while other strand (lagging strand) replicates in a discontinuous manner, *i. e.*, synthesises short fragments called Okazaki fragments. Both the strands synthesise new strand in 5' →3' direction (of new strand).

232 **(a)**
In eukaryotic cells, thylakoids, it present, are grouped inside the chloroplasts instead of floating freely in cytoplasm

233 **(c)**
On rough endoplasmic reticulum, the ribosomes are attached to the surface by ribophorin-I and ribophorin-II. The ribosomes are meant for protein synthesis.

234 **(b)**
Adenine+Ribose→Adenosine
Adenosine+H_3PO_4 →Adenylic acid.
(Adenosine monophosphate).

235 **(c)**
DNA ligase is an enzyme used to joint the DNA fragments. This enzyme catalyses the formation of a covalent bond between adjacent 5' – P and 3' – OH termini in a broken polynucleotide strands of ds-DNA.

236 **(a)**
Golgi bodies are helpful in transportation of different substances and transformation of membranes of one type into another. Golgi bodies form acrosome during spermatogenesis, also take part in the formation of a number of products from glycoprotein, complex heteropolysaccharides.

237 **(b)**
The inner membrane of mitochondria possess finger like projections called cristae. Cristae bear racket or club-shaped structures called oxisomes or F_1-particles. Each oxisome has a spherical head subtended by a stalk and a base (F_0).

238 **(a)**
Pilli are not involved in locomotion. Actually, pilli are longer, fewer and thicker tubular outgrowths, which develop in response to F^+ or fertility factor in gram negative bacteria

239 **(a)**
In chloroplast, **grana** possess green photosynthetic pigment chlorophyll.

240 **(b)**
A-Cisternae, B-Vesicle, C-*trans* face and D-*cis* face

241 **(a)**
DNA is a polymer of nucleotides, so nucleotide is the ultimate unit of DNA.

242 **(d)**
Acid and heat both make DNA denatured.

243 **(a)**
Nucleic acids are made up of pentose sugar, nitrogenous bases and phosphoric acids. There are two types of nucleic acid, *i. e.*, DNA and RNA. DNA contains deoxyribose sugar, while RNA contains ribose sugar.

244 **(d)**
(a) **Helicase** Unwinds the double helix
(b) **DNA polymerase-I** Erases primer and fill gaps
(c) **DNA polymerase-II** Synthesises DNA
(d) **Primase** Synthesises RNA primers

245 **(b)**
Cystolith is a mass of calcium carbonate, occasionally of silica, formed on ingrowths of epidermal cell walls in some plants.

246 **(c)**
Cell membrane transported large quantity of micromolecules, macromolecules and food particles. The endocytosis is of two types, *i.e.*, pinocytosis (intake of fluid) and phagocytosis (ingestion of large particles). In exocytosis, the exotic vesicles perform bulk transport outwardly.

247 **(d)**
Adenosine monophosphate (AMP), ADP and ATP are the nucleotides of RNA due to the presence of ribose sugar along with nitrogenous base adenine and PO_4^{-3}. The nucleotides of DNA are deoxyadenosine monophosphate (*d*-AMP), *d*-GMP, *d*-CMP and *d*-TMP.

248 **(a)**
Smooth Endoplasmic Reticulum (SER) has no ribosomal association. SER is the site of lipids and steroid hormone synthesis.

249 **(b)**
Nuclear membrane with pores separates nucleus from surrounding cytoplasm.

250 **(a)**
The Okazaki fragments in DNA chain growth polymerise in the 5'-3' direction and explain 3'→5' DNA replication.

251 **(c)**
Mitochondrion possesses highest number of enzymes.

252 **(c)**
In eukaryotic cell, a cell wall can have upto three parts-middle lamella, primary wall and secondary wall

253 **(d)**
Chromatin is composed of nucleosome which contains eight histone molecule around which DNA is wound. Some portion of chromatin takes darker stain during interphase called heterochromatin while the portion which take lighter stain are called euchromatin.

254 **(c)**
Enzyme catalase is found in peroxisome.

255 **(d)**
Vacuoles are separated from cytoplasm by a membrane called tonoplast

256 **(b)**
I. Cells that have membrane bound nuclei are called eukaryotic cells
II. In both animal cells and plant cells, cytoplasm is the main arena of cellular activities
III. Cells that lacks a membrane bound nucleus are called prokaryotic cells

257 **(d)**
The nitrogenous bases are of two types, *i.e.*, purine and pyrimidine.
Purines are heterocyclic and two ring compounds, *e.g.*, adenine, guanine.
Pyrimidines are single ring compounds, *e.g.*, thymine, cytosine, uracil.

258 **(a)**
F Griffith discovered the phenomenon of transformation.

259 **(b)**
A combination of **nitrogen** base (purine/pyrimidine) with a pentose sugar (deoxyribose/ribose) in known as nucleoside.

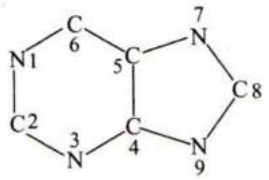
260 **(a)**
The membrane potential of a cell favours the movement of cations into the cell.

261 **(b)**
The prokaryotic cells lack nucleus, membrane bounded cell organelles (like chloroplast, mitochondria, ER, Golgi body, etc). The respiratory enzymes are present in cell membrane.

262 **(b)**
Histones are rich in the basic amino acids-arginine and lysine but completely lack tryptophan. They are very highly modified proteins, the modifications include acetylation, methylation and phosphorylation.

263 **(c)**
Centrioles are present in animals, but absent in plants

264 **(c)**
Purine ring possesses nitrogen at 1, 3, 7 and 9 position.



265 **(b)**
Monosaccharides area simplest sugars and can be triose, tetrose, pentose, hexose, heptose, heptose for 3, 4, 5, 6 and 7 C-atom containing sugar respectively.
Triose: Glyceraldehyde, dihydroxyacetone
Tetrose: Erythrose, threose
Pentose: Ribose, deoxyribose, ribulose
Hexose: Glucose, fructose, mannose, galactose

266 **(d)**
Lysosomes, glyoxysome and spherosomes are single membrane bound cell organelles.

267 **(c)**
DNA does not directly participate in protein synthesis.

268 **(a)**
Benda (1897) gave the term **'mitochondria'** after **Richard Altmann** (1894) who described them as **'bioplasts'.**

269 **(a)**
Mitochondria is bound by two highly specialised membranes. The inner membrane is impermeable and highly convoluted, forming a series of infoldings known as cristae, in the matrix space.

270 **(a)**
Leucoplasts are of three types:
(i) **Elaiopasts** which store facts
(ii) **Amyloplasts** which store carbohydrates
(iii) **Aleuroplasts** which store proteins.

271 **(d)**
The Golgi complex functions primarily as a processing plant where proteins newly synthesized in endoplasmic reticulum are modified in specific ways. It is primarily associted with secretory activities of the cell.

272 **(b)**
During maturation of sperm, the acrosome is formed by the Golgi apparatus.

273 **(b)**
Thylakoid space is present only ion chloroplasts. The inner membrane of mitochondria folded to form cristae.

274 **(c)**
Golgi apparatus is present in all eukaryotic cells. These are absent in prokaryotic cells, *e. g.*, bacteria and blue-green algae.

275 **(a)**
Organisation of a cell has not been achieved in bacteriophage

276 **(a)**
Concept of cellular totipotency was first given by **Haberlandt** (1902) but was proved by **Steward** (1965). Cellular totipotency is the ability of a somatic cell to produce the entire organism.

277 **(a)**
Peroxisome does not contain DNA.

278 **(a)**
Plasma gel is the name of **ectoplasm.**

279 **(a)**
In prokaryotes, cell wall is present and possesses muramic acid. Membrane bound organelles are absent

280 **(a)**
The bacterium *E. coli* is a prokaryote.

281 **(d)**
Uracil + ribose +phosphate can form a nucleotide of RNA. Each nucleotide consists of a nitrogenous base, a sugar and a phosphate group.

282 **(c)**
B-DNA is helical structure with 20 Å diameter and the distance between the two base pairs is 3.4Å and there are 10 base in each turn or pitch (one round). Hence, one turn of the helix is approximately 34Å or 3.4 nm (10Å=1.0 nm).

283 **(c)**
F_1-particles or oxysomes are present on the cristae of mitochondria. Oxysomes involved in oxidative phosphorylation.

284 **(a)**
Adenine (A) is paired with Thymine (T) and Guanine (G) is paired with Cytosine(C).

285 **(b)**
In a hair pin model of RNA, **Guanine** is present at the short end.

286 **(d)**
The unit membrane, described by **J David Robertson**, was considered as 75 Å thick trilaminar (3 layered membrane). According to his unit membrane or trilaminar model, unit membrane consists of 35Å thick bimolecular phospholipid layer between two protein layers, each with 20Å thickness.

287 **(b)**

According to fluid mosaic given by **singer** and **Nicolson** (1972), plasma membrane consists of a continuous bilayer of phospholipid molecules, in which globular proteins are embedded.

288 **(d)**
The phosphate is found in both DNA and RNA.

289 **(c)**
Robert Hooke (1635-1703) was a mathematician and physicist. He developed a new microscope with which he studied the internal structure of a number of plants. His work is famous for the study of cork cells
In 1665, Robert Hooke wrote a book *Micrographia* on some physiological descriptions of minutae made by magnifying glasses with observations and enquiries. The chapter, which gave birth to cell biology is Observe XVIII

290 **(b)**
Due to the presence of basic histone proteins, nucleus is stained by the basic dyes

291 **(b)**
On starting of DNA replication, the two strands of DNA double helix unwind with the help of DNA unwinding protein (also called helicase). The unwinding occurs as this protein begins its binding with DNA strands, thus, breaking the hydrogen bonds between complementary nitrogenous bases.

292 **(c)**
The Golgi complex add chains of sugar molecule to membrane proteins and lipids creating a sugar coating known as 'glycocalyx'. Different cell types exhibit different varieties of glycolipids and glycoproteins on their surface; which act as all identity markers.

293 **(b)**
The 3-D structure of DNA represented by a double helix, in which each turn has a diameter of 34Å and contains 10 base pairs at a distance of 3.4Å. The width of DNA molecule is 20Å.

294 **(d)**
The basic plan of the structure of *t*RNA assumes the pattern of a clover leaf. The structures of different *t*RNA for almost all amino acids are now available and all of these fit the clover leaf model.

295 **(c)**
Proline is not present in the cell membrane.

296 **(b)**

These vacuoles contain water, phenol, flavonols, anthocyanins, alkaloids and storage products such as sugars and proteins.

297 **(c)**
23 S *r* RNA in bacteria is the enzyme ribozyme for the formation of peptide bond. 23 S *r* RNA is found in large sub-unit (70 S) of ribosome of bacteria.

298 **(a)**
Adenine (A) is complementary to thymine (T) and guanine (G) is complementary to cytosine (C). There are two hydrogen bonds between A and T while three hydrogen bonds between guanine (G) and cytosine (C).

299 **(a)**
Cystolith is a structure found in some plants, *i. e.*, nettles, formed by an ingrowth of the cell wall and carrying grains of calcium carbonate at its tip.

300 **(a)**
Enzyme acid phosphatase is found functional in lysosome. It acts on substrate phosphomonoestar and convert it into monophosphates.

301 **(c)**
Primary wall of eukaryotic cells is two layered but secondary wall is atleast three layered

302 **(a)**
Ochoa and **Korenberg** (1956) first synthesised nucleic acid *in vitro*.

303 **(d)**
In animal cell, reserve food is usually glycogen and fat

304 **(a)**
The type of ribosome found in prokaryote is 70S type

305 **(b)**
According to Chargaff's rule, the total amount of adenine released is equal to the total amount of thymine and the total amount of cytosine is equal to the total amount of guanine, *i. e.*, A=T and C=G. Thus, if DNA molecule contains 15% adenine then C and G will constitute 70%, out of which guanine will be 35%.

306 **(a)**
A-Sugar, B-Protein, C-Lipid bilayer, D-Integral protein, E-Ceytoplasm

307 **(d)**
The prokaryotes lack membrane bound organelles such as mitochondria, endoplasmic reticulum, Golgi apparatus, lysosomes, microtubules, microfilaments and centrioles

308 **(b)**
Semi conservative replication of DNA was first demonstrated in *E. coli*. According to the semi conservative model proposed by **Watson** and **Crick**, each strand of the two double helices formed would have one old and one new strand. The semi conservative nature of DNA replication was proved by the experiment of **Meselson** and **Stahl** (1958).

309 **(a)**
Rough endoplasmic reticulum (RER), the ER bearing ribosomes on their surface, is actively involved in protein synthesis, secretion and transport of substances. Smooth endoplasmic reticulum (SER), the ER devoid of ribosome, is the major site for synthesis of lipid. In animal cells lipid-like steroidal hormones are synthesized in SER.
Ribosomes are the site of protein synthesis.
Mitochondria are the site of aerobic respiration. They produce cellular energy in the form of ATP hence, they are called 'power house' of the cell. Oxidative phosphorylation occurs on the inner membrane of mitochondria.

310 **(a)**
Lysosomes were discovered by **Christian de Duve** (1955) from rat liver. **Matile** (1964) discovered lysosomes in plants. Generally, lysosomes are 0.2-0.8μ in size, irregular membranous vesicles filed with **hydrolytic enzymes**. They are polymorphic.

311 **(c)**
Nucleolus forms ribosomal subunits by wrapping the *r*RNA with ribosomal proteins. The ribosomal subunits later leave nucleus through the nuclear pores.

312 **(d)**
Plasma membrane – Lipid bilayer, in which proteins are embedded
Mitochondria – Bacteria like elements with inner membrane highly folded
Chloroplasts – Bacteria like elements with inner membrane forming sacs containing chlorophyll, found in plant cell and algae.
Golgi apparatus – Stacks of flattened vesicles

313 **(c)**
In eukaryotic cells, genetic material is organised into chromosomes. DNA is bounded with histone proteins to form chromatin

314 **(c)**
Total DNA (100)=A+T+C+G
A=20 % (given)
A=T (Base pairing rule)
100=20+20+C+G
C+G=100-40=60
$\frac{C}{G} = 30(C = G)$

315 **(b)**
Every chromosome essentially has a primary constriction or the centromere on the sides of which disc-shaped structures called kinetochores are present
Based on the position of the centromere the chromosomes can be classified into four different types

316 **(c)**
The **transfer RNA** or *t*RNA is the smallest RNA, which are usually 70-80 nucleotides long. It constitutes about 10-20% of total cellular RNA. Since *t*RNA are difficult to be separated by ultra centrifugation, they are also called as soluble RNA or *s*RNA.

317 **(d)**
Kappa particles are self replicating cytoplasmic bodies containing DNA. They are present in *Paramecium* and associated with the production of poisonus substance used for self defence. It shows cytoplasmic inheritance.

318 **(d)**
(a) Helicase – Unwinds the double helix
(b) DNA polymerase–I – Erases primer and fill gaps
(c) DNA polymerase-II – Synthesises DNA
(d) Primase – Synthesises RNA primers

319 **(b)**
The chromatin is formed of a series of repeating units called nucleosomes. Each nucleosome consists of a chain of DNA twist around a histone octamer. The core of nucleosome consists of four histones namely$H_2A, H_2B, H,$ and H_4. Another histone namely H_1 is associated with linker region.

320 **(b)**
Plant and animal cells, both have cell membrane and nucleolus.

321 **(b)**
Eukaryotes possess split genes, where the coding bases are interrupted by some non-coding sequences. These coding sequences of DNA are

called exons, while the non-coding DNA sequences are called introns.

322 **(d)**
The plasma membrane of eubacteria resembles to that of eukaryotic cell. It is made of phospholipid, protein and some amount of polysaccharides. However, it lacks sterol, the characteristic of eukaryotic cell membrane. Instead, there is sterol like hopanoid.

323 **(c)**
Pits are formed on the cell wall due to lack of secondary wall material.

324 **(c)**
Prokaryotic cells may vary greatly in shape and size. The four basic shapes of bacteria are bacillus (rod-like), coccus (spherical), vibrio (Comma shaped) and spirillum (spiral)

325 **(d)**
The major functions of boron are:
Carbohydrate transport through phloem
Uptake and utilisation of calcium
Pollen germination
Root nodulation
Synthesis of pectins, proteins and nucleic acids
Cell elongation and cell differentiation.

326 **(b)**
Lipids are arranged in bilayers and proteins are embedded in it. Lipids are arranged within the membrane with polar head towards the outer side while hydrophobic tails towards the inner side

327 **(b)**
Messenger RNA (*m*RNA) acts as a template for protein synthesis. It is produced by DNA with the help of process called transcription by RNA polymerase-II. The 5′ end of the *m*RNA is modified by capping and the 3′ end is modified by polyadenylation.

328 **(b)**
Lysosome is filled with digestive enzymes (like protease, nuclease, phosphatase, etc) which work at acidic pH. The lysosomes release hydrolases in the diseases or ageing cells digest them (autolysis). So, cell biologists called lysosomes as 'suicidal bags'.

329 **(d)**
A palindrome is a sentence which reads the same forwards and backwards. The DNAs of several eukaryotes are shown to have palindromic sequences in which nucleotides of one strand going in one direction are same as the nucleotide of other strands going n other direction, *e. g*,

G A A T T C
C T T A A G

330 **(c)**
Each ribosome is formed of two unequal sub units, which join only at the time of protein synthesis. In 70 S type of ribosome, 50S and 30S are larger and smaller subunits respectively.

331 **(c)**
In RNA, thymine is replaced by uracil.

332 **(b)**
Most prokaryotic cells, particularly the bacterial cells, have a chemically complex cell envelope. The cell envelope consists of a tightly bound three layered structure, *i.e.*, the outermost glycocalyx followed by the cell wall and the plasma membrane

333 **(c)**
Nucleic acids are the information storage devices of cell. The two varieties of nucleic acid are deoxyribonucleic acid (DNA) and ribonucleic acid (RNA).

334 **(a)**
In mitochondria, the inner membrane space is filled with a matrix which contains dense granules along with ribosomes and mitochondrial DNA. The mitochondrial DNA is circular in nature.

335 **(b)**
The characteristic feature of bacterial nucleus is absence of nuclear membrane, nucleolus and nuclear sap and such a nucleus is called **nucleoid** or genophore. It contains DNA and RNA.

336 **(d)**
Chloroplast A chloroplast is covered by an envelope made up of two smooth membranes
Nucleus A nucleus is a specialised double membrane bound protoplasmic body which contains all the genetic information for controlling cellular metabolism and transmission to the posterity
Mitochondria A mitochondria contains two membranes and two chambers, *i.e.*, outer and inner. The two membranes forms the envelope of the mitochondrion

337 **(c)**
Singer and Nicolson proposed fluid mosaic model of cell membrane. According to this model cell membrane is composed of two type of protein, *ie*.,

integral and extrinsic, lipids and carbohydrate in form of glycolipid and glycoprotein.

338 **(c)**
The man arena of various types of activities of a cell is cytoplasm. Cytoplasm is an aqueous substance containing a variety of cell organelles along with non-living inclusions. The soluble part of cytoplasm forms the background material or ground substance between the cell organelles.

339 **(b)**
In plants, the cytoplasm of mature cell, generally contain one large central vacuole. Vacuole are produced from invagination of cell membrane or ER. Cell sap is watery, non protoplasmic and contain dissolved substance in water (both organic and inorganic substance).

340 **(d)**
The process of removal of introns (non-coding genes) and joining of exons (coding genes) is called splicing.

341 **(c)**
The **thylakoids** of chloroplast are flattened vesicles arranged as a membranous network within the stroma. 50% of chloroplast proteins and various components involved (namely chlorophyll, carotenoids and plastoquinone) are present in thylakoid membranes that are involved in photosynthesis.

342 **(b)**
Rudolf Virchow (1855) first explained that the cells gets divided and new cells are formed from pre-existing cells (*omnis cellula-e-cellula*)

343 **(d)**
Prokaryotic cells are differ from eukaryotic cells in organisation of nuclear material. In eukaryotes, nuclear material is present in nucleus, which is surrounded by nuclear membrane, while in prokaryotes nuclear material is dispersed in cytoplasm, there is no well organised nucleus in prokaryotes.

344 **(d)**
Unicellular microscopic organisms were first studied by Leeuwenhoek. He was first to observe, describe and sketch a free living cell. He observed bacteria, Protozoa, spermatozoa, red blood cells, etc.

345 **(b)**
Phospholipids are formed from the precursor called **phosphatidic acid.** A molecule of this acid consists of two non-polar (hydrophobic) fatty acid 'tails' ester-linked to C_1 and C_2 of the glycerol backbone of a hydrophilic 'head' and a negatively charged phosphate group linked to C_3 of glycerol.

346 **(d)**
Chemically, the plasma membrane or cell membrane is made up of approximately 60% **protein** and 40% **lipids** (by dry weight). The percentage of **carbohydrates** ranges from 1-10, which are in the form of glycoproteins or glycolipids.

347 **(b)**
J d Waston and **F H C Crick** (1953) proposed a double helical structure of DNA. It is also known as **right handed B-DNA.**

348 **(c)**
In prokaryotes, additional small circular DNA entities called plasmids are present. Plasmids carry additional specific factors like nitrogen fixation, resistance, fertility, etc. DNA present as genetic material is naked and often called genophore, nuclear body or nucleoid

350 **(b)**
There are many views regarding the origin of Golgi body. Some workers considered that Golgi body has originated from plasma membrane or from nuclear envelope. But most of the workers believe that Golgi body is originated from ER, particularly from the rough ER by the loss of ribosomes.

351 **(d)**
Telomerase is a ribonucleoprotein.

352 **(b)**
In *Neisseria gonorrhoeae*, fimbriae takes part in I. attachment, while in *Escherichia coli* it helps in II. conjugation

353 **(d)**
Muscle and nerve cells are comparatively very large. Longest cells of human body are the nerve cells, which may reach a length of upto 90 cm

354 **(a)**
A complete set of chromosomes, or of chromosomal genes, inherited as a unit from one parent is called genome. Human genome contains 3.2×10^9 bp.

355 **(d)**
Both DNA and RNA are polymers of nucleotides.

356 **(d)**
In prokaryotic cell, flagella, it present, are single stranded, and without differentiation of axoneme and sheath

357 **(a)**
Mathew Meselson and **Franklin Stahl** (1957) proved that DNA replication is semi-conservative. They obtained DNA strands, which were 50% radioactive and 50 non-radioactive.

358 **(b)**
Smooth endoplasmic reticulum is the part of endoplasmic reticulum on which ribosomes are not present and it takes part in lipid synthesis, fat synthesis, glycosylation of carbohydrates, steroid synthesis and detoxification. Whereas rough endoplasmic reticulum is the site of protein synthesis.

359 **(c)**
Endocytosis is the process by which materials enter a cell without passing through the plasma membrane. The membrane folds around material outside the cell, resulting in the formation of sac-like vesicle into which the material is incorporated. This vesicle is then pinched off from the cell surface so that is lies within the cell.

360 **(d)**
DNA polymerase-I enzyme corrects mistakes in DNA by removing mismatched nucleotides. It has proof reading activity and hence used in DNA repairing.

361 **(d)**
In a prokaryotic cell, DNA lies freely in the cytoplasm, not associated with any organelle
The amount of DNA remains unchanged as there are no haploid or diploid stages. Transcription and translation occurs in the cytoplasm. Protein synthesis occurs only in cytoplasm

362 **(d)**
Lysosome was discovered by **C de Duve.**
The main functions of lysosomes are:
(i) Digestion of large extracellular particles
(ii) Digestion of intracellular substance
(iii) Autolysis
(iv) Extracellular digestion.

363 **(d)**
Viriods, prions and viruses, all are exceptions to the cell theory

364 **(a)**
In prokaryotes like bacteria, BGA, etc, DNA is not associated with histone proteins and called naked DNA.

365 **(a)**
Golgi complex consists of three membranous components, *i. e.*, cisternae, vesicles and vacuoles.
The main function of Golgi body is the secretion of metabolites, proteins, polysaccharides, formation of cell wall during cell division and acrosome formation.

366 **(a)**
In prokaryotes, cell wall is present in bacteria and cyanobacteria. A cell wall is absent in mycoplasma or PPLO. Cell wall, if present, possesses muramic acid

367 **(a)**
Mechanical support and enzyme circulation are the functions of both RER and SER, while the protein is synthesised by RER and detoxification of drugs by SER.

368 **(c)**
A eukaryotic flagellum is a bundle of 9 fused pairs of microtubule doublets, surrounding two central single microtubules
The so called 9 + 2 structure is the characteristic of core of eukaryotic flagellum called an exoneme

369 **(b)**
The RNA primer is used in replication of DNA.

370 **(a)**
The cytoplasn of eukaryotic cells contain organelles such as mitochondria, chloroplasts, Golgi bodies, lysosomes, peroxisomes, etc. Out of these mitochondria and chloroplasts contain DNA which inherited *via egg*.

371 **(c)**
Ribosome (site of protein synthesis) and nucleolus (site of *r*RNA synthesis) are amembranous cell organelles.

372 **(b)**
Cytoplasm is the crystallo-colloidal complex that forms the protoplasm excluding its nucleoid.
Cytoplasm is granular due to presence of large number of ribosomes. Membrane bound cell organelles as found in eukaryotes are absent in prokaryotes
Cytoplasm is present in prokaryotic as well as in eukaryotic cells. Ribosomes are also present in both, prokaryotic as well as eukaryotic cells
In prokaryotes, it is of 70S in nature, while in eukaryotes it is of 80S

373 **(c)**
Schwann defined a cell as a membrane enlocked, nucleus containing structure. He also proposed a cell hypothesis (Schwann; 1838) that bodies of animals and plants are made up of cells and their products

374 **(d)**
DNA is helically coiled macromolecule made up to two antiparallel polydeoxyribonucleotide chains held together by hydrogen bonds. One turn of spiral has a distance of 34Å. It contains 10 nucleotides in each chain so that the distance between adjacent nucleotides is 3.4Å. Hence, the length of DNA having 23 base pairs is 3.4×23=78.2Å.

375 **(b)**
50 S subunit of 70 S ribosome is composed of 23S *r*RNA and 5 S *m*RNA +32 different proteins.

376 **(d)**
A multicellular organism is composed of numerous cells. The cells are of three main types
(i) **Undifferentiated or Stem Cells** They are unspecialised cells which usually possess the power of division, *e.g.*, stem apical meristem, root apical meristem, vascular cambium, cork cambium, stratum germinativum of skin, germina epithelium, bone marrow, etc. Zygote is also an undifferentiated cell
(ii) **Differentiated or Post-mitotic Cells** The cell are specialised to perform specific functions. Differentiation occurs in shape, size, structure and function through an orderly switching on and off of some particular genes of the cells by means of chemicals named as inducers and repressors. It leads to better organisation, division of labour and higher efficiency. Duplication of work is avoided
(iii) **Dedifferentiated cells** They are differentiated cells which revert to undifferentiated state to take over the function of division. The process by which they lose their specialisation is called dedifferentiation. It involves reactivation of certain genes that prevent differentiation, allow limited growth and induce division. Cork cambium of plants is always produced through dedifferentiation.
Dedifferentiation helps in healing of wounds, regeneration in animals, or vegetative propagation in plants. Cell culture experiments are based on this dedifferentiation of cells

377 **(c)**
Ribosome is small dense rounded cell organelle clouds, separated as a fraction by ultracentrifugation and named it as microsome. In fact, microsomes refer to particles, which get separated from ER. It was rich in **ribosomes**. On the basis of chemical nature they are described as **ribonucleoprotien particles** or RNP particles.

378 **(d)**
S Ochoa was awarded Nobel Prize in 1959 along with A Kornberg for *in vitro* synthesis of polyribonucleotides, while A Kornberg alone was related with DNA synthesis.

379 **(b)**
In mitochondria, the enzymes of electron transport chain are found in the inner membrane while outer membrane contains enzymes involved in mitochondria lipid synthesis and those enzymes which convert lipid substrates into forms that are subsequently metabolised in the matrix.

380 **(b)**
In a prokaryotic cell, the ratio of A + T/G + C is low, <1

381 **(c)**
Mitochondria are semi-autonomous organelles. The matrix in their inner membrane space is filled with ribosomes and mitochondrial DNA.

382 **(d)**
Presence of **plastids** is the characteristic feature of plants cells. Animal cells lack plastids, even then they function properly and divide mitotically like plant cells.

383 **(b)**
One coil of DNA has 10 base pairs hence, the six coils contain 60 base pairs. The nitrogen base pairs linked by two hydrogen bonds are 22. Hence, the nitrogen base pair with three hydrogen bonds, *i. e.*, G=C will be 60-22=38.

384 **(b)**
The sub-metacentric chromosomes has centromere nearer to one end of the chromosome resulting in one shorter arm and one longer arm

385 **(c)**
Lysosomes are single membrane bound structures containing excess amount of hydrolytic enzymes. These are also known as **'suicidal bags'** of the cell.

386 **(a)**
Basal body or blepharoplast (kinetosome) or basal granule is associated with the structure cilia and flagella.

387 **(b)**
Gene is not continuous in higher organism, within a single gene there may be four or five silent or

non-coding regions. These regions are called introns.

388 **(c)**
Tonoplast is the single layered membrane covering that bounds the vacuole filled with cell sap.

389 **(d)**
Four major classes of lipids are commonly presents in the plasma membrane, *ie*., phospholipids, sphingolipids, glycolipids and sterols. According to fluid mosaic model, the lipids are present as bilayer at right angle to the surface (*i. e*., head parallel).

390 **(d)**
F_1-particles or elementary particles or subunit of Fernandez-Moran is associated with the inner mitochondrial membrane. Each particle consists of a base piece, a stalk and a head piece.

391 **(c)**
Schwan (1839), a British Zoologist, studied different types of animal cells and reported that cells had a thin outer layer, which is today known as the 'plasma membrane'.
Based on his studies on plant tissues, he also concluded that the presence of a cell wall is a unique character of the plant cells. On the basis of this, Schwann proposed the hypothesis that the bodies of animals and plants are composed of cells and its products.
Schleiden and Schwann together formulated the cell theory. This theory however, did not explain as to how new cells were formed. Rudolf Virchow (1855) first explained that cells gets divided and new cells are formed from pre-existing cells (*Omnis cellula-e-cellula*).
He modified the hypothesis of Schleiden and Schwann to give the cell theory a final shape. *Cell theory as understood today is*
(i) All living organism are composed of cells and products of cells
(ii) All cells arise from pre-existing cells

392 **(a)**
Nucleolus is the site of ribosomal RNA synthesis. During interphase, nucleus contains loose and indistinct network of nucleoprotein fibres called chromatin

393 **(c)**
Ribosomes are the granular structures, and are composed of RNA and proteins. These are not surrounded by any membrane.

394 **(c)**
Lamarck observed, that nobody can have life if its constituent parts are not formed of cells

395 **(d)**
When the cell wall of a plant cell is removed, the remaining is called **protoplast.** It is commonly used in tissue culture during protoplast fusion.

396 **(a)**
Virchow was a German pathologist. In 1858, he published his classical book **Cellular Pathology** in which he asserted that functional units of life, the cells are the primary sets of disease and cancer.

397 **(a)**
Secondary active transport is of two main types- Co-transport (*e. g*., glucose and some amino acids along with inward pushing of excess Na^+) and counter transport (Ca^+ and H^+ import outwardly as excess Na^+ passes inwardly).

398 **(d)**
Transport of metabolites across the biomembrane occurs through
(i) **Passive Transport** Transport of molecules across plasma membrane along the concentration gradient
This could occur through simple diffusion or through facilitate diffusion (with the aid of some carriers of channels)
(ii) **Active Transport** Movement of molecules against the concentration gradient with the help of energy (ATP)
(iii) In case of bacteria, plasma membrane forms the extensions to form special membranous structures called mesosomes
It plays an important role in respiration. In some prokaryotes, like cyanobacteria, membrane extension froms chromatophores, which contains pigments

399 **(c)**
Z-DNA is left handed and possesses double helix containing zig-zag pattern, 12 base pairs per turn and 18Å diameter

400 **(a)**
The Golgi apparatus principally performs the function of packaging materials. Golgi apparatus is the main site of formation of glycoproteins and glycolipids.

401 **(d)**
The prokaryotic cells are represented by bacteria, blue-green algae, mycoplasma and PPLO

402 **(b)**

Movement of cytoplasm around the vacuole in the cells is called rotation.

403 **(d)**
Prokaryotic cells have DNA (circular) without histones. Generally flagella, if present, are single-stranded and without differentiation of axoneme and sheath

404 **(c)**
During DNA replication, enzymes DNA dependent DNA polymerase, primase and ligase are used, while RNA dependent DNA polymerase synthesises DNA form RNA during reverse transcription.

405 **(d)**
Fundamental features of cell theory are
I. All living organisms are composed of cells and their products
II. Each cell is made of a small mass of protoplasm containing a nucleus inside and a plasma membrane with or without a cell wall outside
III. All cells are basically alike in their chemistry and physiology
IV. Activities of an organism are the sum total of activities and interactions of its constituent cells

406 **(b)**
Prokaryotic ribosomes has sedimentation coefficients of 70S type.

407 **(a)**
The plasmid DNA confers certain unique phenotypic characters to such bacteria in which they are found. One such character is resistance to antibiotics

408 **(b)**
Robert Hook (1665) discovered hollow cavities like compartments in a thin slice of cork under his microscope. He coined the term *cellula* and wrote the book Micrographia. M **Schleiden** and T **Schwann** gave the cell theory.

409 **(c)**
All these three are double membrane bound structures which are differentiated from proplastids and divide by fission like process.

410 **(b)**
Primary wall of eukaryotic cell is made up of a polymer of β, 1-4 acetyl glucosamine

411 **(a)**
Under adverse conditions, the enzymes released by the lysosome destroy the cell itself. So, lysosomes are also known as suicidal bags.

412 **(a)**
According to Chargaff's rule, in DNA purines and pyrimidines are always in equal proportion (*i. e.*, A+G=T+C) and proportion of adenine is always equals to that of thymine, while proportion of guanine always equals to that of cytosine (*i. e.*, A=T and G=C). So, option (a) is correct.

413 **(d)**
The central vacuole of plant cells function in storage, waste disposal, cell elongation and protection, whereas peroxisomes produce hydrogen peroxides as a waste product.

414 **(b)**
Inner membrane forms finger-like structures called cristae.

415 **(d)**
Every living cell is externally covered by a thin transparent, electron microscopic, elastic semipermeable membrane called cell membrane. It is composed of lipids (mostly phospholipid), proteins (peripheral and integral) and carbohydrates (glycoprotein and glycolipids)

416 **(c)**
Z-DNA is left-handed double-helix with $zig-zag$ back bone. The helix of Z-DNA is 18Å in diameter containing 12bp per turn. One of Z-DNA has 45Å length.

417 **(a)**
Many bacteria have small circular DNA outside the genomic DNA. These smaller DNA are called plasmids

418 **(c)**
In 1967, **Breidenback** and **Beevers** discovered glyoxysomes in fat storing cells or germinating fatty seeds.

419 **(c)**
Nucleolus is present is nucleoplasm and attached to a particular chromosome at particular place.

420 **(a)**
During replication of a bacterial chromosome, initiation of DNA synthesis always requires a smaller segment of RNA called RNA primer.

421 **(c)**
A sugar molecule and a nitrogenous base form a nucleoside, and a nucleoside plus a phosphate group form a nucleotide. The nucleotides of RNA are called ribonucleotides, and those of DNA deoxyribonucleotides. Ribonucleotides contain the sugar ribose and deoxyribonucleotides contain the sugar deoxyribose.

422 **(a)**

Mitochondria is the site of cellular aerobic respiration in eukaryotic cells. In mitochondria, energy is stored in the form of ATP from the oxidation of food material that is why mitochondria is called the power house of cell.

423 **(a)**
Bacterial flagella are unistranded, equivalent to a single microtubular fibre. It consists or three parts *i.e.*, basal body, hook and filament

424 **(c)**
The middle lamella is cementing layer between the cells. It is made up of calcium and magnesium pectates. The basic chemical unit of pectin is galacturonic acid, which
have the capability of salt formation with calcium and magnesium (an acid base reaction).

426 **(b)**
Plasmalemma lacks RNA

427 **(c)**
Demosomes are intercellular junctions occurring typically where animal cells require adhesion against stress. Desmosomes hold cells together.

428 **(b)**
DNA is a polymer of nucleotides, which comprise nitrogen base (A, G, T, C), sugar (deoxyribose) and phosphoric acid.
The four types of nucleotides present in DNA are as follows:

Deoxynucleoside	$+H_3PO_4$	Deoxyribonucleotide	Abbreviation
Deoxyadenosine	$+H_3PO_4$	Deoxyadenylic acid	*d*AMP
Deoxyguanosine	$+H_3PO_4$	Deoxyguanylic acid	*d*GMP
Deoxycyt-idine	$+H_3PO_4$	Deoxycytidylic acid	*d*CMP
Deoxythy-midine	$+H_3PO_4$	Deoxythymidylic acid	*d*TMP

429 **(d)**
All the given statements regarding Golgi apparatus are true.

430 **(d)**
Heating of DNA strands at temperatures 80-90°C results to breakage of hydrogen bonds between nitrogen bases of two strands (denaturation). The strands show reunion on cooling (renaturation/annealing).

431 **(a)**
The primary cell wall contains many small openings or pores situated in the primary pit fields. The cytoplasm of adjacent cells communicate through the pores by means of cytoplasmic bridges called plasmodesmata. The plasmodesmata permits circulation of fluids and passage of solutes between cells.

432 **(c)**
Studies by the freeze-fracture technique show that the outer surface of the thylakoid membrane is covered by large (12 nm) particles and smaller (8 nm) particles.

433 **(d)**
Membrane proteins that speed the movement of solute across a membrane by facilitating diffusion are called transporters or **permeases.**

434 **(b)**
*t*RNA is referred to as soluble RNA.

435 **(a)**
In eukaryotic cell, ribosome are of 80S type. 70S ribosomes however, occurs in plastids and mitochondria

436 **(c)**
Secondary cell wall grows by apposition. In this method, new cell wall material secreted by protoplasm is deposited as definite thin plates one after the other on the inner surface of original wall.

437 **(b)**
Spherosomes are single membrane bound small spherical organelles, which synthesize and store fats in plants. They develop from ER.
Spherosomes were called as microsomes by **Hanstein** (1880). Spherosomes in plant cells correspond to lysosomes in animal cells.

438 **(a)**
A DNA sequence is **sense**, if its sequence is the same as that of *m*RNA copy that is translated into protein. The sequence on the opposite strands is called antisense sequence.

439 **(d)**
The prokaryotic cells are represented by bacteria, blue-green algae, mycoplasma and PPLO.
Prokaryotic cells are generally smaller and multiply more rapidly than the eukaryotic cells

440 **(d)**
Reserved cells (quiescent cells) are undifferentiated and have the capacity of cell division.

441 **(c)**

The thylakoids in chloroplasts are arranged as stacked discs.

442 **(a)**
Rough Endoplasmic Reticulum (RER), the ER bearing ribosomes on their surface, is actively involved in protein synthesis, secretion and transport of substance. Smooth Endoplasmic Reticulum (SER), the ER devoid of ribosomes is the major site for synthesis of lipid
In animal cells, lipid like steroidal hormones are synthesised in SER. Ribosomes are the site of protein synthesis. Mitochondria are the sites of aerobic respiration
They produce cellular energy in the from of ATP hence, they are called 'power house of the cell'. Oxidative phosphorylation occurs on the inner membrane of mitochondria

443 **(a)**
A-Nucleus, B-Rough endoplasmic reticulum, C-Ribosome, D-Cytoplasm, E-Smooth endoplasmic reticulum

444 **(a)**
Tonoplast is the membrane that bounds the vacuole of the plant cell.

445 **(d)**
The saccules or cisternae are frequently curved to give a definite polarity to the Golgi apparatus. One face of the apparatus is convex while the other is concave. The convex side is called forming (*cis* face) face while the concave side of the apparatus is known as maturing face (*trans* face)

446 **(a)**
The ribosome has two binding sites for *t*RNA molecules: The A (aminoacyl) and P(peptidyl) and E (exit) site is for polypeptide..

447 **(d)**
The DNA molecule is a polymer like molecule (heteropolymeric) and is made up of several thousand pairs of nucleotide manomers. A nucleotide is formed by the union of a phosphate group with a nucleoside.

448 **(a)**
Most prokaryotic cells, particularly the bacterial cells, have a chemically complex cell envelope. The cell envelope consists of a tightly bound three layered structure, *i.e.*, the outermost glycocalyx followed by the cell wall and the plasma membrane

449 **(d)**
Ribosomes are large, non-membranous RNA-protein complexes, which are necessary for protein synthesis.

450 **(d)**
The main function of Golgi apparatus is to chemically modify and transport the materials received by it. An important glycoprotein secreted by the Golgi body is mucin. It is secreted by goblet cells of respiratory and intestinal epithelium.

451 **(a)**
All eukaryotic cells are not identical. Plant and animal cells are different as plant cells possess cell wall, plastids and a large vacuole which are absent in animal cells.
On the other hand, animals cells have centrioles which are absent in almost all plant cells

452 **(d)**
Ribosomes are electron microscopic ribonucleoprotein particles attached either on RER in eukaryotic cell or free in cytoplasm in prokaryotic cell. The ribosomes found in prokaryotes, chloroplast and mitochondria are 70 S while in eukaryotes are 80 S type.

453 **(c)**
Maximum amount of calcium pectate is present in middle lamella of cell wall.

454 **(c)**
In an eukaryotic cell, DNA is found mainly in nucleus but mitochondria and chloroplasts both also contain a single copy of double stranded, circular DNA molecules.

455 **(c)**
In eukaryotes, 80 S type ribosomes are found. They are divided into two subunits, the larger is 60 S and smaller is 40 S.

456 **(d)**
This is written by **Watson** and **Crick.**

457 **(b)**
The anticodon loop of two-dimensional clover leaf model of *t*RNA consists of seven unpaired bases the third, fourth and fifth of which (form the 3' end of molecule) constitute the anticodon. The anticodon permits complementary pairing with three bases on *m*RNA.

458 **(d)**
All are correct

459 **(d)**
A nucleoid represents the genetic material of prokaryotes. It is often called genophore, nuclear body or nucleoid. It is equivalent to a single naked

chromosome and is, therefore, also called prochromosome

460 **(d)**
Nucleic acids are the polynucleotides composed of carbon, hydrogen, oxygen, nitrogen and phosphorus. They control the basic functions of the cell. On the basis of nucleotides these are of two types – DNA (Deoxyribonucleic Acid) and RNA (Ribonucleic Acid). These are found in all living cells and viruses as genetic material. These are also found in autonomous organelles like mitochondria and chloroplast.

461 **(b)**
The actual values of sedimentation coefficients of eukaryotic ribosomes are 79-80 S in fungi and 80 S in mammals. The sedimentation coefficients of two subunits is 40S (small) and 60S (large).

462 **(c)**
Flagella of prokaryotic and eukaryotic cells differ in micro-tubular organization and type of movement. In eukaryotes, that arrangement is (9+2) and specialised while in prokaryotes, arrangement is (9+0) and is simple.

463 **(d)**
Duplication of DNA molecule is known as replication. The DNA is copied by enzymes called DNA polymerase, which acts on single stranded DNA synthesising a new strand complementary to the original strand. DNA polymerase require a short double stranded region to initiate or prime DNA synthesis, this is produced by an RNA polymerase, called primase, which is able to initiate synthesis on single stranded DNA. The final step required to complete synthesis of the lagging strand is for the Okazaki fragments to be joined together by phosphodiester bonds, which is carried out by **DNA ligase.**

464 **(b)**
A special membranous structure is the mesosome which is formed by the extensions of plasma membrane into the cell. There extensions are in the form of vesicles, tubules and lamellae
They help in cell wall formation, DNA replication and distribution to daughter cell. They also help in respiration and secretion processes to increase the surface area of the plasma membrane and enzymatic content

465 **(a)**
Lysosomes are the reservoirs of hydrolytic enzymes and are known as suicidal bags of the cells. These are involved in extracellular as well as intracellular digestion and show autophagy (digestion of surplus organelles) and autolysis (self- destruction of the cell).

466 **(d)**
All statements are correct

467 **(a)**
Cisternae are the flattened usually unbranched, sac like units of endoplasmic reticulum. These are arranged in stacks or piles parallel to one another and bear ribosomes.
Tubules are tubular branched elements of ER, vesicles are oval or rounded, vacuole like elements of ER scattered in cytoplasm, while cristae are the components of mitochondria.

468 **(b)**
Secondary active transport depends upon chemiosmotic energy (membrane potential and /or ion gradient). In the given question, transport is against ion concentration gradient thus, showing secondary active transport.