CELL - THE UNIT OF LIFE

1. Match Column-I with Column-II and select the correct option from the codes given below.

Column I	Column II
A. Leeuwenhoek	(i) First saw and described a living cell
B. Robert Brown	(ii) Presence of cell wall is unique to plant cells
C. Schleiden	(iii) Discovered the nucleus
D. Schwann	(iv) All plants are composed of different kind of cells.

(A)A-(i), B-(iii), C-(iv), D-(ii)
(B)A-(i), B-(iii), C-(ii), D-(iv)
(C)A-(iii), B-(i), C-(iv), D-(ii)
(D)A-(i), B-(iv), C-(ii), D-(iii)

2. *Omnis cellula e cellulae i.e.,* new cell arise from pre-existing cells; this statement was given by
(A)Schleiden and Schwann (B)Rudolf Virchow
(C)Robert Brown (D)Robert Hooke

3. Arrange the following steps in a correct sequence as per Gram's staining techniques:
Treatment with 0.5% iodine solution (1), washing with water (2), treatment with absolute alcohol/acetone (3), staining with weak alkaline solution of crystal violet (4).

(A) 4 → 1 → 2 → 3 (B) 3 → 2 → 1→ 4
(C) 3 → 1 → 2→ 4 (D) 4 → 2 → 3→ 1

4. Which of the given statements are correct?
(i) *Bacillus subtilis* is a Gram (+) bacteria.
(ii) *Escherichia coli* is a Gram (–) bacteria.
(iii) Washing 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.

(A) (i) and (ii) (B) (ii) and (iii)
(C) (i) and (iii) (D) (i), (ii) and (iii)

5. Prokaryotic cells are generally _____ and multiply _____ than the eukaryotic cells.

(A) smaller, slower (B) larger, slower
(C) smaller, faster (D) larger, faster

6. Mesosomes are the infoldings of cell membrane, which
(i) are present in both prokaryotic and eukaryotic cells.
(ii) help in cell wall formation, DNA replication and respiration.
(iii) increase the surface area of plasma membrane.

(A) (i) and (ii) (B) (ii) and (iii)
(C) (i) and (iii) (D) (i), (ii) and (iii)

7. Correct sequence of layers of bacterial cell envelope from outward to inward is (A) Cell wall → Glcyocalyx → Cell membrane (B) Cell membrane → Glcyocalyx → Cell wall (C) Glcyocalyx → Cell wall → Cell membrane (D) Glcyocalyx → Cell membrane → Cell wall.

8. Read the given statements and select the correct option.
Statement 1: In prokaryotes mitochondria are absent.
Statement 2: In prokaryotes mesosomes are present which help in respiration.
(A) Both statements 1 and 2 are correct and statement 2 is the correct explanation of statement 1.
(B) Both statements 1 and 2 are correct but statement 2 is not the correct explanation of statement 1.
(C) Statement 1 is correct and statement 2 is incorrect.
(D) Both statements 1 and 2 are incorrect.

9. The type of ribosomes found in prokaryotes is
(A) 80S type (B) 70S type
(C) 30S type (D) 50S type

10. If you remove the fimbriae from the bacterial cell, which of the following would you expect to happen?
(A) The bacteria could no longer swim
(B) The bacteria would not adhere to the host tissue
(C) Transportation of molecules across the membrane would stop
(D) The shape of bacteria would change

11. Plant cells differ from animal cells in having
    (A) cell wall (B) plastids
    (C) a large central vacuole (D) all of these

12. Which one is the mis-matched pair?
    (A) Largest isolated single cell - Egg of an ostrich
    (B) Golgi apparatus - Discovered by Altman
    (C) Mitochondria - Name was given by Benda
    (D) Lysosomes - Discovered by de Duve

13. Read the given statements and select the correct option.
    Statement 1: The cisternae in Golgi complex have *cis* face and *trans* face.
    Statement 2: The *cis* face is also called forming face and *trans* face is also called maturing face.
    (A) Both statements 1 and 2 are correct and statement 2 is the correct explanation of statement 1.
    (B) Both statements 1 and 2 are correct but statement 2 is not the correct explanation of statement 1.
    (C) Statement 1 is correct and statement 2 is incorrect.
    (D) Both statements 1 and 2 are incorrect.

14. Select the wrong statement with respect to the structure of a plant cell.
    (A) Cellulosic cell wall present inside the cell membrane have carrier proteins.
    (B) Centrioles are usually present in lower plant forms.

(C) A large central vacuole is present taking up 90% of cell volume.
(D) Golgi apparatus is formed of a number of unconnected units called dictyosomes.

15. According to unit membrane structure, the thickness of plasma membrane is about

(A) $35A^{\circ}$ (B) $20\AA$

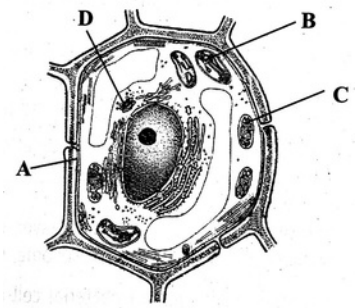
(C) $75A^{\circ}$ (D) $100A^{\circ}$

16. Match Column-I with Column-II and select the correct option from the codes given below.

Column I	Column II
A. Mitchondria	(i) Without membrane
B. Lysosomes	C. (ii) Single membrane
Ribosomes	D. (iii) Double membrane
Nucleus	

(A) A-(i), B-(ii), C-(iii), D-(ii)
(B) A-(iii), B-(i), C-(i), D-(ii)
(C) A-(iii), B-(ii), C-(i), D-(iii)
(D) A-(ii), B-(iii), C-(i), D-(iii)

17. Identify the parts labeled as A, B, C and D in the given ultrastructure of a plant cell and select the correct option.



	A	B	C	D
(A)	Plasma membrane	Chloroplast	Mitochondrion	Golgi complex
(B)	Plasma membrane	Mitochondrion	Chloroplast	RER
(C)	Cell wall	Mitochondrion	Chloroplast	RER
(D)	Cell wall	Chloroplast	Mitochondrion	Golgi complex

18. Match Column-I with Column-II and select the correct option from the codes given below.

Column I		Column II	
A. Dictyosomes	(i)		Storage
B. Mitochondria	(ii)	Photosynthesis	
C. Vacuoles		(iii) Transport	
D. Grana		(iv) Secretion	
		(v)	Respiration

(A) A-(iv), B-(v), C-(i), D-(ii) (B) A-(i), B-(ii), C-(iv), D-(iii) (D) A-(i), B-(ii), C-(iii), D-(iv)

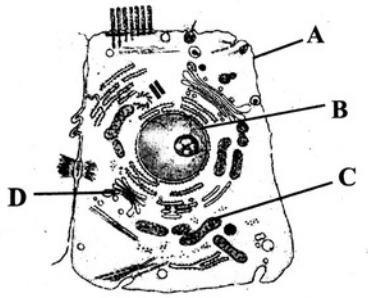
(C) A-(iv), B-(i), C-(ii), D-(iii)

19. In which of the following part of mitochondria succinic dehydrogenase enzyme is located?

(A) Perimitochondrial space (B) Outer membrane

(C) Matrix (D) Inner membrane

20. Given is the ultrastructure of an animal cell. Identify the parts marked as A, B, C and D.



	A	B	C	D
(A)	Plasma membrane	Nucleus	Mitochondrion	Golgi complex
(B)	Plasma membrane	Vacuole	Mitochondrion	Golgi complex
(C)	Cell wall	Nucleus	Mitochondrion	RER
(D)	Cell wall	Vacuole	Chloroplast	Golgi complex

21. Match Column I with Column II and select the correct option from the codes given below.

Column I	Column II
A. Nucleolus	(i) Lipid storage
B. Sphaerosomes	(ii) Glycolate metabolism
C. Peroxisomes	(iii) Transport of macromolecules
D. Plasmodesmata	(iv) RNA synthesis

(A) A-(iv), B-(i), C-(iii), D-(ii)
(B) A-(i), B-(ii), C-(iv), D-(iii)
(C) A-(iv), B-(i), C-(ii), D-(iii)
(D) A-(i), B-(ii), C-(iii), D-(iv)

22. Match the cell organelles given in Column-I with cellular processes in Column-II and select the correct option from the codes given below.

Column I	Column II
A. Lysosomes	(i) Protein synthesis
B. Ribosomes	(ii) Hydrolytic activity

C. Smooth endoplasmic reticulum	(iii) Steroid synthesis
D. Centriole	(iv) Formation of spindle

(A) A-(ii), B-(i), C-(iii), D-(iv)
(B) A-(i), B-(iii), C-(iv), D-(ii)
(C) A-(i), B-(iv), C-(iii), D-(ii)
(D) A-(iv), B-(iii), C-(i), D-(ii)

23. Match Column-I with Column-II and select the correct option from the codes given below.

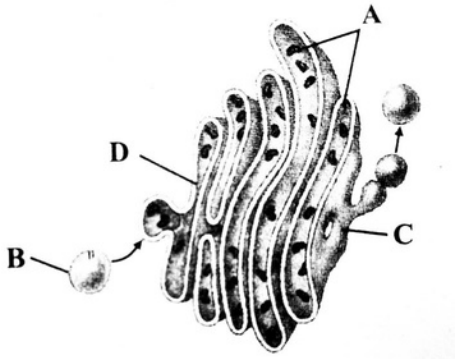
Column I	Column II	
A. RER	(i)	Intracellular and extracellular digestion
B. SER	(ii)	Lipid synthesis
C. Golgi complex	(iii)	Protein synthesis and secretion
D. Lysosomes	(iv)	Moves materials out of the cells

(A) A-(iii), B-(ii), C-(iv), D-(i) (B) A-(ii), B-(iii), C-(iv), D-(i)
(C) A-(i), B-(iii), C-(ii), D-(iv) (D) A-(iv), B-(ii), C-(iii), D-(i)

24. Read the given statements and select the correct option.
Statement 1: Chloroplast and mitochondria are semi-autonomous bodies.
Statement 2: Chloroplast and mitochondria have their own DNA and protein synthesizing machinery.

(A) Both statements 1 and 2 are correct and statement 2 is the correct explanation of statement 1.
(B) Both statements 1 and 2 are correct but statement 2 is not the correct explanation of statement 1.
(C) Statement 1 is correct and statement 2 is incorrect.
(D) Both statements 1 and 2 are incorrect.

25. Select the option with correct labeling of given structure of Golgi apparatus.



	A	B	C	D
(A)	Cisternae	Vesicle	*trans* face	*cis* face
(B)	Cisternae	Vesicle	*cis* face	*trans* face
(C)	Vesicle (D)	Cisternae	*cis* face	*trans* face
Tubules		Vesicle	*trans* face	*cis* face

26. Study the following statements regarding mitochondria and select the correct ones.
(i) These are the sites of aerobic respiration.
(ii) Matrix contains single circular ds DNA molecule, a few RNA molecules, 70S ribosomes.

(iii) Mitochondria divide by fission.
(iv) Mitochondria are fully-autonomous.

(A) (i) and (ii) (B) (ii) and (iv)

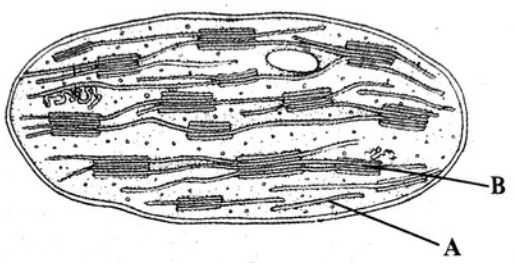
(C) (i), (ii) and (iii) (D) (i), (ii), (iii) and (iv)

27. Read the given statements.

(i) Flat membranous sacs in stroma of chloroplasts.
(ii) Infoldings in mitochondria.
(iii) Disc shaped sacs in Golgi apparatus.
Select the correct option as per codes given above.

	Cristae	Cisternae	Thylakoids
(A)	(iii)	(i)	(ii)
(B)	(i)	(ii)	(iii)
(C)	(ii)	(iii)	(i)
(D)	(iii)	(ii)	(i)

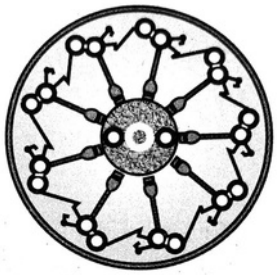
28. Identify A and B in the given figure and select the correct option.



	A	B
(A)	Grana thylakoid	Stroma thylakoid

(B) Stroma	thylakoid	Grana thylakoid
(C) Granum		Stroma
(D) Stroma		Granum

29. Which of the following is correct for the given structure?



(A) These are small structures which work like oars.
(B) It is covered with plasma membrane.
(C) Its core is called axoneme.
(D) All of these.

30. The chromosome in which centromere lies slightly away from the middle of the chromosome resulting into one shorter arm and one longer arm, is called as

(A) metacentric
(B) submetacentric
(C) acrocentric
(D) telocentric.

31. Read the given statements.

(i) Centromere is present in the middle of the chromosome and forms two equal arms.
(ii) Chromosome has a terminal centromere.
(iii) Centromere lies close to the end of the chromosome forming one extremely short and one very long arm.

(iv) Centromere lies slightly away from the middle of the chromosome resulting into one shorter arm and one longer arm.

Select the correct option as per the codes given above.

	Metacentric	Submetacentric	Acrocentric	Telocentric
(A)	(i)	(iv)	(iii)	(ii)
(B)	(i)	(ii)	(iii)	(iv)
(C)	(iv)	(i)	(iii)	(ii)
(D)	(iv)	(ii)	(iii)	(i)

32. Ribosomes are composed of

(A) RNA only
(B) Proteins only
(C) RNA and proteins
(D) RNA, proteins and DNA

33. Read the given statements and select the correct option.

Statement 1: Peroxisomes are involved in photorespiration of the plant cells and help in the lipid metabolism of animal cells.

Statement 2: They are the cell's garbage disposal system.

(A) Both statements 1 and 2 are correct and statement 2 is the correct explanation of statement 1.

(B) Both statements 1 and 2 are correct but statement 2 is not the correct explanation of statement 1.

(C) Statement 1 is correct and statement 2 is incorrect.

(D) Both statements 1 and 2 are incorrect.

34. Which of the following is correct for the origin of lysosome (L)?

(A) ER → Golgi bodies → L (B) Golgi bodies → ER → L (C) Nucleus → Golgi bodies → L (D) Mitochondria → ER → Golgi bodies → L

35. Read the given statements regarding a cell organelle. (i) It contains water, sap, excretory products and other unwanted materials. (ii) It is bounded by a single membrane called tonoplast. (iii) In plant cells, it can occupy upto 90% of cellular volume. (iv) It maintains turgor pressure. The above features are attributed to

(A) lysosome
(B) vacuole
(C) peroxisome
(D) mitochondrion.

35. Match Column-I with Column-II and select the correct option from the codes given below.

Column I	Column II
A. Chloroplasts	(i) Colourless plastids
B. Chromoplasts	(ii) Yellow, orange or red coloured plastids
C. Leucoplasts	(iii) Green plastids

(A) A-(iii), B-(i), C-(ii)
(B) A-(iii), B-(ii), C-(i)
(C) A-(i), B-(iii), C-(ii)
(D) A-(i), B-(ii), C-(iii)

37. Which of the following is the correct match?

(A) Amyloplasts - Store carbohydrates
(B) Elaioplasts - Store fats and oils
(C) Aleuroplasts - Store proteins
(D) All of these

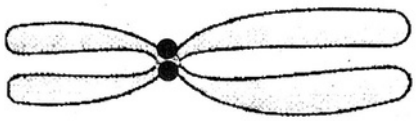
38. Which of the following is correct regarding the structure of a section of cilia/flagella?

	Peripheral microtubules (doublets)	Central microtubules (singlets)	Radial spoke s	Central sheath
(A)	9 + 0	2 9 +	8	1
(B)	9 + 2	0 2 6	9	1
(C) 9 (D) 3			9	1
			9	1

39. Which of the following options is correct about structures visible in the cross section of a centriole?

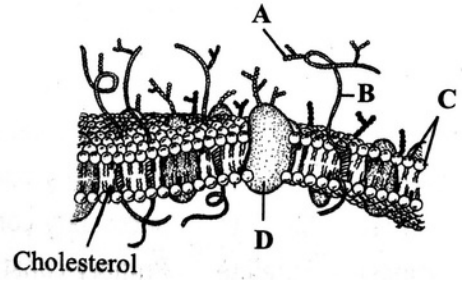
	Peripheral microtubules (triplets)	Central microtubules (singlets)	Hub	Spokes	Inter triplet bridge
(A)	9	2	1	9	9
(B)	9	2	9	9	9
(C)	9	2	1	2	2
(D) 9		0	1	9	9

40. Which of the following is correct regarding the given figure?



	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

41. Identify the components labeled A, B, C and D in the given figure of cell membrane from the list (i) to (vii) given along with and select the correct option.



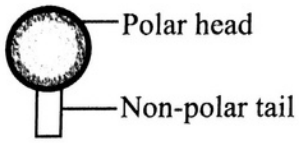
Components:

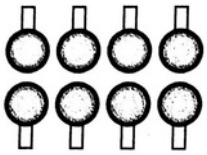
(i) Sugar (ii) Protein (iii) Lipid bilayer

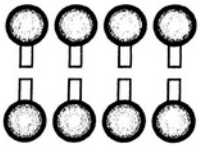
(iv) Integral protein (v) Cytoplasm (vi) Cell wall (vii) External protein

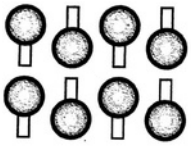
The correct matching of components is
(A) A-(i), B-(ii), C-(iii), D-(iv) (B) A-(ii), B-(i), C-(iii), D-(iv) (C) A-(i), B-(ii), C-(iii), D-(vi) (D) A-(i), B-(ii), C-(iii), D-(vii)

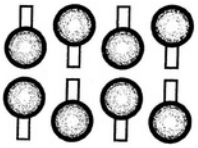
42. The lipid molecules present in plasma membrane have polar heads and non-polar tails (as shown in figure).
Which option represents the correct arrangement of lipids in lipid bilayer?



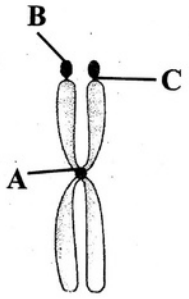
(A) 

(B) 

(C) 

(D) 

43. What does A, B and C represent in the given figure of a chromosome?



	A	B	C

(A)	Centriole	Satellite	Primary constriction
(B)	Centriole	Satellite	Secondary constriction
	(C) Centromere	Satellite	Primary constriction
(D)	Centromer	Satellite	Primary constriction

44. _____ are the microbodies, which take part in glyoxylate pathway, bounded by a single membrane and are usually present in germinating fatty seeds.
(A) Glyoxysomes (B) Peroxisomes
(C) Sphaerosomes (D) Lysosomes

45. According to most recent studies each chromosome consists of
(A) single double helical DNA which is highly coiled and folded
(B) variable number of DNA helices, depending upon the length of chromosome
(C) many small DNA helices, which are joined by peptide linkages
(D) small DNA helices, wrapped around each other like a rope.

ANSWERS

1. A 2. B 3. A 4. D 5.C 6.B 7.C 8. B 9. B 10. B
11. D 12. B 13. B 14. A C 15.C 16.C 17. A 18. A 19. D 20. A
21. 22. A 23. A 24. A A 25.A 26.C 27. C 28. B 29. D 30. B
31. 32. C 33. C 34. A A 35.B 36. B 37. D 38. C 39.. D 40. B
41. 42. B 43. C 44. A 45. A

SOLUTIONS

2. Rudolf Virchow modified the cell theory and gave the theory 'omnis cellula e cellulae' – means new cells develop by division of the pre-existing cell. This is called theory of cell lineage or common ancestry.
5. Prokaryotic cell is usually small (0.1 – 5.0 μm) in size whereas eukaryotic cell sie is comparatively larger (5 – 100 μm). Prokaryotic cells multiply very rapidly by asexual means like binary fission, sporulation etc.
6. Mesosomes are present only in prokaryotes.
7. Glycocalyx is the outermost layer of the cell envelope. Cell wall lies between plasma membrane and glycocalyx.
9. The cytoplasmic ribosomes of prokaryotes (blue green algae, bacteria and PPLOs) are 70S. They have two subunits 50S and 30S.

10. Fimbriae are hair like structures present in large number in bacteria. They help in attaching bacteria to solid surfaces or host tissues.
11. A plant cell has rigid wall on the outside. It has plastids and a centrally located large vacuole. All of these are absent in an animal cell.
12. Golgi apparatus was discovered by Camillo Golgi in nerve cells of barn owl and cat.
14. Cell wall is the hard outer protective cells of plants, and supportive covering of fungi and auxiliary cover some protists. In plants it is made up of cellulose and present outer to cell membrane. Membrane have carrier proteins for active transport.
15. According to Robertson's concept of unit membrane, the cell membrane is trilaminar. It has a thickness of about 75 A with a central lipid layer of 35 A thick and two peripheral protein layers of 20A each.
19. Succinate dehydrogenase, an enzyme complex involved in TCA cycle, is located in inner mitochondrial membrane.
30. In submetacentric type of chromosome, the centromere lies at some distance away from the midpoint, dividing the chromosome into two unequal arms.
32. Chemically ribosomes consist of two parts, proteins and rRNA. Proteins are both structural and enzymatic.
33. Peroxisomes are found in photosynthetic cells and perform photorespiration. They also take part in lipid metabolism. Lysosomes are the cells's garbage disposal system.
43. Centromere, also called primary constriction, is a non-stainable area. At this region. Each chromatid has a trilaminar plate-like kinetochore where spindle microtubles join the chromosome

during cell division. Kinetochore plays an important role in chromosome movement.

45. There is a single, long, double-stranded, linear DNA molecule in a chromosome. The DNA contains biological and genetic information. It is highly coiled and folded, however this packing varies during the cell cycle.