

Dr. Bbosa Science

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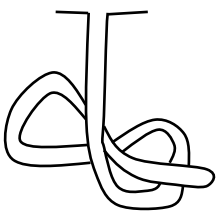
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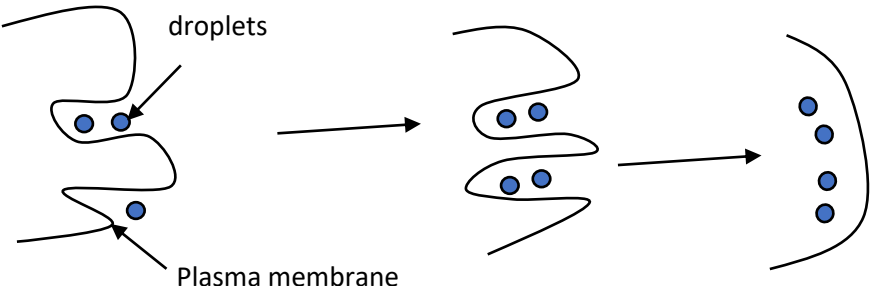
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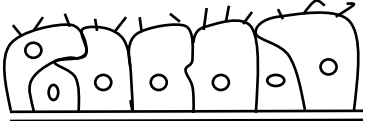
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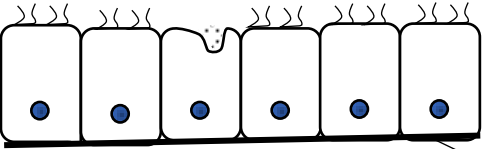
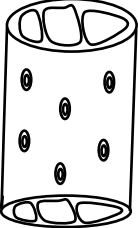
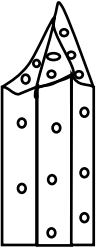
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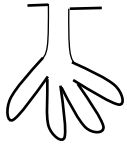
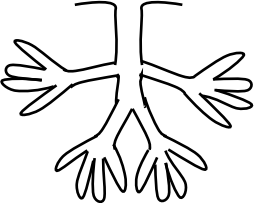
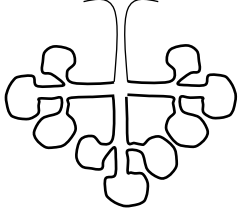
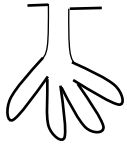
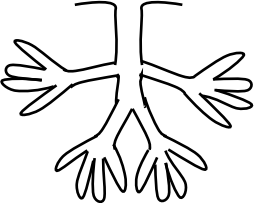
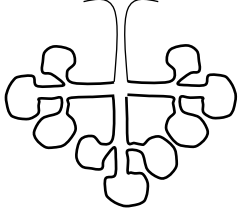
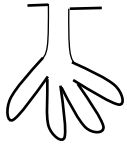
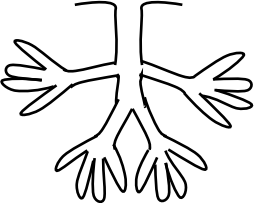
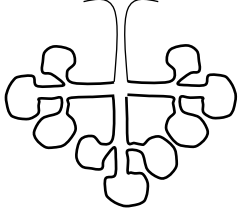
Exercise

1.	2015/1/15	Which of the following epithelium tissues line blood capillaries? A. Cuboidal tissue B. Squamous tissue C. Columnar tissue D. Glandular tissue
	Comment	<i>The simple squamous epithelium line the blood capillaries. This is because it is thin to allow easy diffusion of material through it.</i>
2.	2014/1/4	The function of the nucleoli in a cell is to form A. The nuclear membrane B. Ribose C. The spindle during nuclear division D. Centrioles
	Comment	<i>The nucleolus is the site of synthesis of ribosomal RNA which is combined with protein in the cytoplasm to make ribosome</i>
3.	2013/1/4	The figure below shows a glandular tissue  In which part of the mammalian body is the tissue likely to be? A. Ileum B. Lungs C. Stomach D. Skin
	Comment	The figure shows a coiled tubular gland. This is typical of the sweat

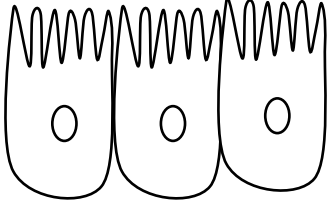
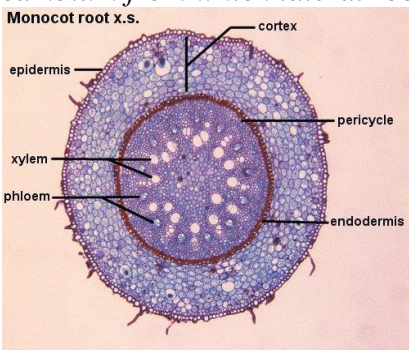
		gland in mammalian skin NB. The ileum contains simple, tubular glands called crypts of Lieberkühn The stomach contains simple branched, tubular glands called gastric glands The lung do not contain glandular epithelium. Their air sacs are lined with simple squamous epithelium, whose function is to allow exchange of gases between gland and alveolar air.
4.	2013/1/12	Which one of the following consists of a pair of tissues specialized for support? A. Parenchyma and collenchyma B. Collenchyma and sclerenchyma C. Parenchyma and sieve tubes D. Xylem and phloem
	Comment	<ul style="list-style-type: none"> - Collenchyma and sclerenchyma; collenchyma cell have thickened cellulose wall whereas sclerenchyma have lignified walls for support. - Parenchyma tissue is a packing tissue that fills up spaces in plant organ and as storage tissue but may also be involved in support, especially when turgid in non-woody plants. - Xylem is used mainly for transportation of water and mineral salts - Phloem is mainly for transport of manufactured food.
5.	2012/1/20	<p>The type of feeding mechanism shown in figure below is</p>  <p>A. Pinocytosis B. Phagocytosis C. Filter feeding D. Predation</p>
	Comment	<i>A form of bulk transport across the plasma membrane in which the cell membrane invaginates and takes in liquid droplets is called pinocytosis (cellular drinking)</i>
6.	2012/1/28	One disadvantage of multicellular state is the individual cells A. Are always small in size B. Lose independence C. Becomes less functional D. Become less specialized
	Comment	<i>In multicellular organism, cells become specialized to perform certain</i>

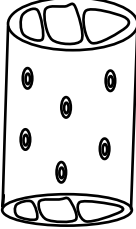
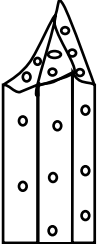
		<i>functions and therefore lose ability to perform other functions. As a result, cells become dependent on each other for functions they are not specialized for.</i>
7.	2012/1/36	The walls of collenchyma cells stained deep blue by methylene blue but not aniline hydrochloride. This shows that the wall A. Are not thickened B. Are thickened by lignin C. Contains living protoplasm D. Are thickened by material other than lignin
	Comment	<i>Thickening of plant cell walls occurs by deposition of extra layer of cellulose wall of by deposition of lignin or suberin (cock). These materials are identified in microscopy by their ability to take up certain stains. Lignin, for example stains yellow with aniline hydrochloride but does not stain with methylene blue. Cellulose does not stain with aniline hydrochloride but stains deep blue with methylene blue.</i>
8.	2012/12	Squamous epithelium is made up of thin and delicate sheets of cell as an adaptation to A. Rapid cell division B. Facilitation of liquid movement C. Shortening diffusion distance D. Protecting the body from abrasion
	Comment	<i>Squamous epithelium is made of thin delicate call to shorten diffusion distance.</i>
9.	2010/1/4	The figure below represents a human tissue  The tissue would most likely be lining the A. Salivary gland B. Stomach C. Ileum D. Oviduct
		No answer because the tissue shown is pseudostratified ciliated epithelium is found in trachea, bronchi and bronchioles. NB <ul style="list-style-type: none"> - The ileum is lined with columnar epithelium possessing microvilli on their free surface to increase surface area for absorption of food, it is not ciliated. - Some renal tubules, e.g., the loop of Henle is lined with cuboidal epithelium possessing microvilli on their free surfaces to increase surface area for reabsorption of materials. - The oviduct is lined by ciliated columnar epithelium, which is differentiated from pseudo-epithelium ciliated epithelium by the

		<p>nuclei of its cells being aligned at the same level</p>  <p>Goblet cell</p> <p>Ciliated columnar</p>
10.	2010/1/7	<p>The figure below represents a</p>  <p>A. Tracheid B. Xylem vessel element C. Sieve tube D. Phloem parenchyma cell</p>
		<p><i>A xylem vessel is formed of a chain of elongated cylindrical cells placed end to end. Their end wall break down partially or completely and their side walls are perforated by numerous pits.</i></p> <p><i>NB</i></p>  <p>Tracheid</p> <p><i>Tracheid is similar to vessel except that they are typically five or six-sided in cross section and instead of being open at the end their tapering end walls are perforated by pits.</i></p> <p>- <i>A sieve tube is long and cylindrical but has no pits, it has end wall perforated by tiny pores.</i></p> <p>-</p>
11.	2009/1/20	<p>Which of the following is not correct about cells of a tissue?</p> <p>A. Are of one type B. Have the same origin C. Have same particular function D. Are physically linked</p>
	Comment	<p><i>A tissue is a group of linked cells and associated intercellular substances that is specialized for a particular function (s). the cells share a common origin, but do not necessarily perform the same function, for example, cells of the blood tissue perform different functions e.g. red blood cells transport oxygen while white blood cells</i></p>

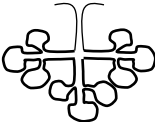
		<i>fight germs.</i>												
12.	2008/1/2	The epithelial type lining the mammalian alveoli is A. Columnar B. Cuboid C. Stratified D. Squamous												
	Comment	<i>Squamous epithelium lines mammalian alveoli and is thin to reduce diffusion distance.</i>												
13.	2008/1/16	A probable function of Endoplasmic reticulum is to A. Control entry and exist of materials form the cells B. Facilitate intracellular transport of materials C. Act as a template for in protein synthesis D. Enable substances diffuse against concentration gradient												
	Comment	<i>Endoplasmic reticulum is intracellular channel system that facilitate intracellular transport.</i>												
14.	2007/1/1	Which of the following is a simple branched tubular gland? A. Brunner's gland B. Salivary gland C. Sweat gland D. Mammary gland												
	comment	The glands presented in this case are of the following type <table border="1" data-bbox="495 1003 1404 1703"> <thead> <tr> <th>Gland</th> <th>Type</th> <th>Shape</th> </tr> </thead> <tbody> <tr> <td>Brunner</td> <td>Simple branched</td> <td></td> </tr> <tr> <td>Salivary gland</td> <td>Compound tubular</td> <td></td> </tr> <tr> <td>Mammary glands</td> <td>Compound saccular</td> <td></td> </tr> </tbody> </table>	Gland	Type	Shape	Brunner	Simple branched		Salivary gland	Compound tubular		Mammary glands	Compound saccular	
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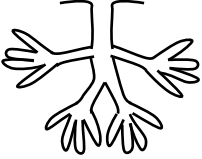

15.	2007/1/9	Which of the following is not correct about cells of a tissue? A. Have similar function B. Are of the same origin C. Are of one type D. Have physical linkage
	comment	<i>A tissue is a group of linked cells and associated intercellular substances that is specialized for a particular function (s). the cells share a common origin, but do not necessarily perform the same function, for example, cells of the blood tissue perform different functions e.g. red blood cells transport oxygen while white blood cells fight germs.</i>
16.	2007/1/24	A property of cells in a multicellular organism is that they A. Small B. Less functional C. Less specialized D. Dependent
	comments	<i>In multicellular organism, cells become specialized to perform certain functions and therefore lose ability to perform other functions. As a result, cells become dependent on each other for functions they are not specialized for.</i>
17.	2007/1/25	Which one of the following tissues has the least power of regeneration? A. Blood tissue B. Epithelial tissue C. Bone tissue D. Nerve tissue
	Comment	<i>Nerve tissue has the least power of regeneration in the body because they cannot divide.</i>
18.	2006/1/3	Which one of the following structures is found in both xylem and phloem in higher plants? A. Sieve tracheid B. Parenchyma cells C. Companion cells D. Hollow vessels
19.	2006/1/11	Which of the following have a sole function of offering support to the plants? A. Sclerenchyma and vessel elements B. Vessel elements and tracheid C. Sclerenchyma and collenchyma D. Parenchyma and collenchyma
	Comment	Collenchyma and sclerenchyma; collenchyma cell have thickened cellulose wall whereas sclerenchyma have lignified walls for support.

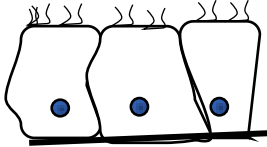
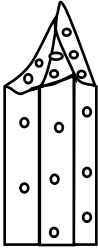
20.	2006/1/31	<p>Which one of the parts of a mammal possesses an epithelial tissue as shown in the figure below?</p>  <p>A. Oviduct B. Ileum C. Respiratory tract D. Loop of Henle</p>
	Comment	<p><i>In oviduct ciliated epithelium propels an egg towards the uterus through the fallopian tubules whereas in the trachea, bronchi and bronchioles, the cilia propel the dust from the breathing system to the esophagus.</i></p>
21.	2005/1/4	<p>The main distinguishing character of a eukaryotic cell is</p> <p>A. Membrane organelles B. Lack of a nucleus C. Presence of a nucleus D. Presence of DNA double strand</p>
22.	2005/1/6	<p>Which of the following organelle would most likely be abundant in the tail of a tadpole at a time of its reabsorption during metamorphosis?</p> <p>A. Centrioles B. Lysosomes C. Golgi apparatus D. Endoplasmic reticulum</p>
	Comment	<p>Lysosome contain enzymes that digest tissues</p>
23.	2004/1/11	<p>In higher plants, the lateral roots originate from the</p> <p>A. Endodermis B. Epidermis C. Pericycle D. Cambium</p>
		<p><i>Pericycle is layer of parenchyma cell between the cortex and the cambium from which lateral roots develop.</i></p>  <p>Monocot root x.s.</p> <p>epidermis cortex pericycle endodermis xylem phloem</p>

24.	2003/1/3	<p>A plant tissue which is tubular, open ended, with lignified and thickened walls is</p> <p>A. Tracheid B. Xylem vessel C. Parenchyma D. Sieve tube</p>
		<p><i>A xylem vessel is formed of a chain of elongated cylindrical cells placed end to end. Their end wall break down partially or completely and their side walls are perforated by numerous pits.</i></p>  <p style="text-align: right;">Xylem</p>  <p style="text-align: center;">Tracheid</p> <p><i>Tracheid is similar to vessel except that they are typically five or six-sided in cross section and instead of being open at the end their tapering end walls are perforated by pits.</i></p> <ul style="list-style-type: none"> - A sieve tube is long and cylindrical but has no pits, it has end wall perforated by tiny pores. - Parenchyma is a storage tissue. Although, turgid parenchyma cells provide support in no woody plants
25.	2003/1/21	<p>Viruses cannot reproduce outside the body because</p> <p>A. Not all of them contain DNA B. They are too small to reproduce C. They are unable to synthesize their own DNA D. They are unable to absorb raw materials from the surroundings.</p>
26.	2003/1/28	<p>Rapid transport of materials within the cytoplasm of a cell is associated with the presence of</p> <p>A. Spindle fibers in the dividing cell B. An extensive endoplasmic reticulum C. Many plasma membrane pores D. Extensive Golgi apparatus</p>
		<p><i>Endoplasmic reticulum is intracellular channel system that facilitate intracellular transport.</i></p>
27.	2003/1/34	<p>Which of the following types of epithelia lines the walls of the mammalian alveoli?</p> <p>A. Columnar epithelium B. Cuboidal epithelium C. Stratified epithelium D. Squamous epithelium</p>

		<i>Squamous epithelium lines mammalian alveoli and is thin to reduce diffusion distance.</i>
28.		Which of the following does not always form part of a bacterium cell? A. Cell wall B. Flagellum C. Cytoplasm D. Ribosome
29.	2002/1/10	Which one of the following cell organelles would be most active at sites where substances move against diffusion gradient? A. Ribosome B. Lysosome C. Mitochondria D. Golgi bodies
		Mitochondria provide energy for active transport
30.	2002/1/15	Which one of the following is not correct about viruses? They A. can only reproduce in living cells B. Are the smallest living organisms C. Are facultative parasites D. Do not have cellular structures
		Viruses cannot reproduce without the host and for this reason they are obligate parasites.
31.	2001/1/16	Which one of the following structures operate independently of nervous control? A. cilia of paramecium B. flagella of euglena C. stinging cells of coelenterates D. pigment cells of fishes
		Paramecium lack a nervous system.
32.	2001/1/26	Which one of the following features would be prominent in mucus secreting cells? A. Large nucleus and dense matrix B. Numerous rough endoplasmic reticulum and Golgi body C. Numerous mitochondria and lysosome D. Dense matrix and smooth endoplasmic reticulum
33.	2001/1/40	Which one of the following types of epithelia experiences the highest wearing? A. Stratified B. Columnar C. Glandular D. Ciliated
		<i>Stratified epithelium is found in areas where the lining is subjected to some abrasion. E.g. oral cavity, skin, esophagus, vagina, rectum and anal canal.</i>

34.	2000/1/21	In which one of the following is ciliated epithelium found? A. Kidney tubules B. Small intestines C. Lining of capillaries D. Lining of alveoli
		<i>Small intestine and kidney proximal convoluted tubule contain microvilli to increase surface area for reabsorption.</i>
35.	2000/1/35	Which of the following gland is compound saccular? A. mammary gland B. sebaceous gland C. sweat gland D. gastric gland
		Compound saccular glands are found Mammary glands and pancreas.  Compound saccular glands
36.	2000/1/37	Which one of the following cell organelle is associates with the final stage of most cell secretion? A. Smooth endoplasmic reticulum B. Rough endoplasmic reticulum C. Ribosome D. Golgi Apparatus
		<i>The main function of Golgi apparatus is collection, packaging and distribution of molecules synthesized at one location and utilized at another within the cell or outside it.</i>
37.	1999/1/1	Which of the following is a function of the Golgi body in the cell? A. Secreting substances out of the cells B. Synthesis of proteins C. Assembling of raw materials for secretion D. Synthesis of carbohydrates
38.	2000/1/2	Which of the following cell types are unlikely to be found in the mammalian intestines? A. Columnar B. Ciliated C. Stratified D. Squamous
		<i>Squamous tissue is unlikely to be found in the intestines because it is delicate cannot withstand friction due to passage of food.</i>
39.	1998/1/24	Which one of the following glands has a compound tubular structure? A. Mucus gland in the skin of frog and other amphibians B. Salivary gland in the mouth of a mammal C. Brunner's gland in the walls of a mammalian small intestine D. pancreas

		Compound tubular makes up parts of the pancreas which secretes digestive enzyme and mammary gland and salivary gland.		Compound tubular gland
40.	1999/1/25	<p>What role is associated with the endoplasmic reticulum?</p> <p>A. Site for protein synthesis</p> <p>B. Isolation and transport of the proteins synthesized</p> <p>C. Synthesis and transport of lipids and steroids</p> <p>D. Production of amino acids</p>		
		<p><i>Endoplasmic reticulum a frame work of phospholipid bilayer embedded in protein matrix has the following additional functions.</i></p> <ul style="list-style-type: none"> - <i>Provides large surface area for those chemical reactions in the cell that depend on membrane system such as photosynthesis and protein synthesis.</i> - <i>It provides a frame work of support in the cell.</i> - <i>Intracellular transport system</i> - <i>Modification of synthesized proteins to form glycoproteins by addition of carbohydrate group.</i> - <i>Manufacture of cell membrane components such as phospholipids.</i> 		
41		<p>Which of the following is the main function of the Golgi apparatus in a living cell?</p> <p>A. Destruction of worn out cell organelles</p> <p>B. Synthesis of cell wall components</p> <p>C. Synthesis of proteins</p> <p>D. Intracellular transport</p>		
42	1997/1/32	<p>Which one of the following epithelial tissue is illustrated in figure below?</p>  <p>A. Columnar</p> <p>B. Squamous</p> <p>C. Cuboidal</p> <p>D. stratified</p>		
43	1997/1/39	<p>Cells with uniformly thickened and lignified walls are likely to be</p> <p>A. Phloem</p> <p>B. Parenchyma</p> <p>C. Collenchyma</p> <p>D. Sclerenchyma</p>		
44.	2015/1/23	<p>Which one of the following plant tissues perform both storage and support functions?</p> <p>A. parenchyma</p> <p>B. sclerenchyma</p> <p>C. collenchyma</p> <p>D. phloem</p>		

		<i>Turgid parenchyma cells provide support to herbaceous plants.</i>
45.	2014/1/27	<p>The figure below shows an epithelial tissue</p>  <p>The function of the tissue is to</p> <ol style="list-style-type: none"> Increase surface area for absorption of material Provide smooth lining for movement of materials Act as a junction between different tissues Move materials along the surface
		<i>The epithelium shown is a ciliated epithelium. The beating of the cilia creates a current of fluid which move materials along the surface lined by this kind of epithelium.</i>
46	2014/1/36	<p>The figure below is a section of a structure from a plant tissue.</p>  <p>The tissue with such a structure is the</p> <ol style="list-style-type: none"> Collenchyma Parenchyma Phloem Xylem
		<i>The structure shown is that a tracheid. Tracheid constitute xylem tissue</i>
47.		<p>Viruses resemble living organism because they possess</p> <ol style="list-style-type: none"> A nucleus Genetic material A cell membrane Oxidative enzymes
		<i>Living organism are distinguished from nonliving organisms due to presence of genetical materials.</i>
48.	201/1/7	<p>A companion cell has a large nucleus because</p> <ol style="list-style-type: none"> It supports the sieve tube element which has no nucleus It controls a large volume of cytoplasm Movement of material in the sieve tube is active process of its high metabolic rate
		<i>The nucleus of a cell controls all metabolic activities of the cell and as such, the size of the nucleus of s cell is directly proportional to the metabolic activity of the cell. The companion cell is a site for intense metabolic activity and thus has a large nucleus.</i>

49.		Which one of the following tissues would be stained deepest red by a dye that stains nucleic acid? A. Sieve tube B. Tracheid C. Collenchyma D. cambium
		<i>Cambium contain dividing cell with high concentration of nucleic acid especially at prophase when they have double the nucleic acid.</i>
50.	2015/21	Which one of the following plant tissues, have cell with walls least adapted to support? A. Sclerenchyma B. Collenchyma C. Tracheid D. Xylem vessels
		<i>Sclerenchyma, tracheid and xylem are lignified and as such have increased tensile strength to provide support to the plant. Collenchyma tissue only has extra deposition of cellulose and pectin in cell wall which provide less support compared to lignin.</i>
51.	2014/1/28	Growth in size of a single cell is limited by the A. Cytoplasm B. Nucleus C. Cell wall D. Cell membrane
		<i>The nucleus is directly proportional to the size of the cell because it directs activities of the cells.</i>
52.	2004/1/18	The tails pf the phospholipids lie in the center of the cell membrane due to their being A. Light B. Hydrophilic C. Polar D. Hydrophobic
		Hydrophobic or water insoluble
53.	1998/1/10	A young herbaceous stem maintains an erect position mainly due to A. Lignified tissue in the stem B. Water pressure in xylem tissue C. High turgor pressure in the parenchyma cells D. Low osmotic pressure in the parenchyma cells
54.	2015/1/26	In sponges, the different types of cells are independent of each other in function because A. The different cells show division of labor B. Collar cells maintain the flow of water C. Sponges are made of collar flagellates D. The cells are not coordinated
		<i>In sponges, the different types of cells are functionally independent of one another as there is no trace of nervous system to coordinate the cells.</i>

		<i>This is called colonial organization and sponges are best regarded as colonies are best regarded as colonies of single cells rather than multicellular organism.</i>
55	2012/1/8	Which one of the following parts would show a distinct blue color if a cross section of a dicotyledonous plant was stained with iodine solution? A. Pericycle B. Poriferous layer C. Endodermis D. pith
		In dicotyledonous plant, endodermis cells are rich in starch grain. Thus are stained by iodine solution.
57	1996/1/21	Chromophores are A. reproductive cells B. fat-containing cells C. carotenoid containing cells D. pigment-containing cells in certain vertebrates

Paper 1 Section B

1. (2013/1/44) (a) Name two areas in plants where each of the following tissue is found?

- (i) Sclerenchyma (1mark)
- vascular bundle
 - hypodermis of monocotyledonous plant
 - pericycle of dicotyledonous plant in form of secondary xylem and secondary phloem
 - sclerenchymatous fibers on the surface of seeds, e.g. cotton
 - endocarp of nut

- (ii) Collenchyma (1marks)
- In petiole and leaf lamina
 - Stems of herbaceous plants
 - Hypodermis of dicotyledonous stems, as a complete cylinder encircling the entire stem in periphery

(b) Give three structural adaptation of the sclerenchyma tissue for its function (3marks)

- (i) cells are highly lignified thick walls to provide enough resistance to environment
- (ii) cells are dead and therefore place no extra metabolic demand on plant
- (iii) sclerenchyma fibres are elongated and arranged in sheets or strands to increase their strength
- (iv) sclerenchyma fibres are interlocked to enhance their combined strength

(c) Explain the importance of collenchyma tissue in leaves and young stems (02marks)

Collenchyma is the strengthening mechanical tissue of leaves and young stems it supplements the effect of turgid parenchyma in maintaining shape and form of leaves and young stem.

(d) Outline three structural differences between the chlorenchyma and sclerenchyma tissue. (03marks)

Collenchyma	Sclerenchyma
Consist of living cells	Consist of dead cells
Cell wall is thickened with cellulose	Cell wall is thickened with mainly lignin
Cell wall thickening is nonuniform	Cell wall thickening is uniform
Many contain chloroplast	Does not contain chloroplast
Cell cavity is wide	Cell cavity is narrow or even closed
Has no pores	May be perforated with pores in the wall

2. (2011/1/43) (a) Describe the adaptations of each of the following tissues for their functions, giving one example of the site where each of them is found.

(i) Stratified tissue (3marks)

Location

- ✚ Surface of the skin
- ✚ Lining of vagina
- ✚ Lining buccal cavity
- ✚ Lining upper 3rd of the esophagus.

Adaptations

- *Stratified epithelium consists of a number of layers of cells. it is therefore thick forming a tough impervious barrier.*
- *Cells are continually replaced from the mitotic divisions of the germinal layer. This allows the stratified epithelium to withstand friction*
- *In some areas, the cells on the surface are transformed into a dead horny layer of keratin, protect the inner cell from friction and water loss.*

(ii) Collagen tissue (3marks)

Location

- ✚ Connective tissues
- ✚ Tendons

Adaptations

- Consists of collagen fibres which are densely packed in a bundle to provide support to connective tissue
- The fibres have limited elasticity to provide tensile strength

(b) Explain how the structure of proteins enable them to form body tissues and structures (4marks)

- Fibrous proteins are used to form body tissue and structures such as muscles because they are insoluble and have high tensile strength due to coiled and cross linked polypeptide chains.
- Structural proteins such as keratin have a secondary structure in form of an extended spiral helices with cross linking disulphide bridges between neighboring chains, this provide hardness allowing keratin to be found in wool, hair and nails.

3. (1996/1/part B No. 6)

(a) State **two** important difference which can be recognized under the light microscope between plant and animal cells

Differences between plant cell and animal cell

	<i>Plant Cell</i>	<i>Animal cells</i>
1	<i>Has chloroplast</i>	<i>Lack chloroplast</i>
2	<i>Has cell wall</i>	<i>Lack cell walls</i>
3	<i>Has large central vacuole</i>	<i>Lack a vacuole or has small vacuoles</i>
4	<i>Has starch granule</i>	<i>Lack starch granule</i>
5	<i>Nucleus at the side</i>	<i>Nucleus centrally placed</i>

(a) (i) Name the membrane-bounded channels which form a network and almost fill the cytoplasm of most cells and are only recognizable under the electron microscope

Endoplasmic reticulum

(ii) What are the 'small granules' associated with the channels mentioned in (i) and what is their function?

Ribosome

C (i) Give one way by which you would recognize the "colloidal state" of protoplasm

Using electron microscope with appropriate dying techniques

(ii) Which constituent of the protoplasm are responsible for its colloidal state?

Proteins and oils

(b) Viewed under the electron microscope, the cell membrane has a three-layered structure. What is the chemical nature of each of these layers?

Paper 2

1. (2012/1/4) Describe how each of the following tissues are related to their functions

(i) Parenchyma (03marks)

- *Have thin, permeable cell walls for transport of materials*
- *Have air space (are loosely packed) for gaseous exchange*
- *Have large vacuoles for food storage*
- *Contain chloroplasts for photosynthesis*
- *Cells are approximately spherical in shape to package in small space in order to provide support to non-woody parts of the plant.*

(ii) Collenchyma (03marks)

- *Cells are polygonal in outline with deposition of extra cellulose at the corner to provide mechanical support*
- *The cells are elongated parallel to the longitudinal axis of t of the organ in which they are found, providing more support.*
- *The tissue is living and allow for growth of the plant.*

(iii) Sclerenchyma (06marks)

- *Cells have cell walls thickened with deposits of lignin. This provides tensile strength for support*
- *Have elongated fibres which are arranged into strands or sheets to provide support to the plant*
- *The end walls of the cells interlock with each other increasing their combined strength.*

(b) Explain the distribution pattern of mechanical tissue in a stem and root of a dicotyledonous plant. (08marks)

- *In stems, mechanical tissues are found in vascular bundles, pith, cortex and pericycle around the periphery where they resist compression and extension as the stem bend.*
- *In roots, mechanical tissues are arranged in a central stele where they exert a force that counteract the pull of the shoots which are often blown from side to side. They also resist compressional forces from the surrounding soil.*

2. (2011/2/2) (a) Describe the structure of the plasma membrane according to fluid mosaic model (10marks)

According to fluid mosaic model the plasma membrane consist:

- *A bimolecular phospholipid layer with inwardly directed hydrophobic tails and outwardly directed hydrophilic heads. This phospholipid layer is capable of much molecular movement, i.e. is fluid in nature*
- *A variety of globular proteins molecules with an irregular arrangement within the bimolecular phospholipid layer. Some proteins occur on the surface of phospholipid*

layer (peripheral or extrinsic proteins) while others extend into it (transmembrane protein). Viewed from the surface, the proteins are dotted throughout the phospholipid layer in mosaic arrangement. Hence the name fluid mosaic model.

(b) Explain how exocytosis and endocytosis occur across the plasma membrane.

(05marks)

Exocytosis and endocytosis are process of transport of materials out of and into the cell respectively. The material involved are those too large to be absorbed by diffusion or active transport.

During endocytosis, the cell membrane invaginates to form a cup shaped depression in which material is enclosed. The depression is then pinched off to form a vacuole in the cytoplasm of a cell. If the material taken in is a solid, this is called phagocytosis. And if the material taken is a liquid, the process is called pinocytosis.

During exocytosis, a vacuole containing material to be excreted fuses with cell membrane from within. The membranes unite and open up the vacuole releasing the contents to the outside.

(c) Explain the role of proteins within plasma membranes. (05marks)

- *they provide structural support for the membrane. By various interactions, they help to anchor the phospholipid bimolecular layer.*
- *They assist in active transport of materials across the membranes by acting as channels through which especially hydrophilic materials pass*
- *In combination with carbohydrates, as glycoproteins, they act as recognition sites.*
- *They act as enzymes, catalyzing many membrane-associated reactions.*
- *They facilitate diffusion by acting as channels and carriers.*
- *They act as transducers. For example, proteins of the electron transport system in mitochondria*
- *They act as electron carriers in many reactions.*

3. (2010/2/2) (a) Describe the structure of the vascular system in higher plants (7marks)

The vascular system in higher plants consists of two types of vascular tissue, the xylem and phloem.

- The xylem contains two types of conducting cells: tracheid and vessel elements. Both types of conducting cells are hollow, nonliving, and lack end walls. They are connected end to end to form continuous pipelines for water and mineral salts transport. The xylem elements have lignified side walls which are perforated by numerous border pits.
- The conducting cells of phloem are sieve tubes, each associated with a companion cell. Sieve -tube cells contain cytoplasm but no nuclei. Strands of cytoplasm called plasmodesmata, extend from one cell to another through the sieve pores in the sieve plates.

- The vascular system extends from the roots to the leaves and vice versa. In roots, the vascular tissue is located in the vascular cylinder; in stems, it forms a avascular bundle. And in leaves, it is found in leaf veins.

(b) How is the stem in (a) adapted to its function?

(13marks)

Adaptations of xylems to its functions

- *Its cells have no end walls to allow unimpeded flow of water.*
- *Lignin in the cellulose side walls makes it impermeable to water and solutes. This prevents wastage during transport.*
- *Having spiral an annular thickening gives a high tensile strength and prevents the vessel from collapsing.*
- *Presence of pits allow water in and out of the lumen.*
- *Lignin also strengthen the vessels in order to give structural support to the plant.*
- *Have elongated cylindrical cells for continuous flow of water*
- *Torus in bordered pits act as a plug for controlling passage of water in some plants*

Adaptations of phloem to its functions

- The sieve tubes are elongated, cylindrical cells connected, end to end. Their end walls have perforated sieve plates to allow easy flow of materials
- The sieve tubes have no nuclei to create room for movement of materials
- Within the lumen of sieve elements are cytoplasmic filaments/strands which are continuous rom cell to cell to enable continuous flow of materials.
- The companion cells have nuclei and other organelles. They control the flow of materials through the phloem sieve tubes.

4. (2010/2/4) (a) Explain how organisms have overcome the challenges of being multicellular. (12 marks)

These challenges have been overcome in the followings:

- There is division of labor, different cells being adapted to perform specific functions. This has improved efficiency in co-ordination of life-sustain process.*
- Specialized respiratory surfaces have been developed to enhance gaseous exchange*
- A specialized transport system has been developed to move gases and other materials to and from the body cells. For example, in higher plants and animals*
- In some, the body is flattened, thus reducing between the two body surfaces enhancing the process of diffusion. For example, in flatworm and leaves of plants*
- A specialized supporting system such as a skeleton in most animals has been developed to provide support, protect and assist locomotion of the organism.*

- (vi) *In some, the body is constructed such that the tissues are thin. This reduces the diffusion distance. For example, in hydra.*
- (vii) *In some, there exist a system by which the external medium is brought into the body so that it comes into intimate contact with all tissue in order to enhance exchange of materials by diffusion. For example, tracheal system.*
- (b) Explain the movement of animals from place to place (08marks)
 - (i) *to find food*
 - (ii) *to avoid being captured by predator*
 - (iii) *to find new favorable habitat*
 - (iv) *to look for suitable mates*
 - (v) *to avoid overcrowding or intraspecific competition.*

4. (1999/2/2)

(a) Describe the structure of cartilages and bones.

Structure of cartilages

- Cartilages consist of a tough, transparent and homogenous matrix called chondrin formed of a special glycoprotein, chondromucoid.
- The matrix is secreted by chondrocytes enclosed in fluid filled spaces called Lucina
- Cartilages are bound externally by white fibrous connective tissue called perichondrium.
- Blood vessels are present in the perichondrium but not in the matrix.

Structure of bone

- (i) The bone is made of a hard matrix and cells.
- (ii) The matrix of compact bone is made of collagen fibers together with inorganic substances such as calcium, magnesium and phosphorous. These components are arranged in concentric circles called **lamellae**, around an **Haversian canal** containing an artery, a vein, lymph vessel and nerve fibers.
- (iii) Bone cells or osteocytes are found in spaces in the lamellae known as **lacunae** and fine channels called **canaliculi** link lacunae.
- (iv) The system of lamellae around one Haversian canal is called an **Haversian system**.
- (v) The bone is enclosed in a tough sheath called periosteum which contain blood and lymphatic vessels.

(b) How is cartilage replaced by bone?

- (i) the process by which cartilages is replace by bone is called endochondral ossification.
- (ii) A primary center of ossification appears in the middle of the shaft. The chondroblasts arranged in rows, divide rapidly, and become hypertrophied.
- (iii) Calcium and phosphates salts are laid down in the matrix.
- (iv) These changes begin in the center and move outwards. At this stage, we have calcified cartilage and the perichondrium becomes periosteum

- (v) Osteoblast lay down fibers on the surface of cartilage.
- (vi) Cartilage then become calcified to form a compact bone.
- (vii) Osteoclasts erode through bones into cartilage to make canals for blood vessels
- (viii) Osteoblast deposit bone salts in the spaces created to be able to strengthen the bone.

6. (a) Describe the fluid mosaic structure of the plasma membrane. (10marks)

The fluid mosaic model of the cell

- The cell membrane is about 7nm thick
- It consists of a continuous phospholipid bilayer in which proteins are scattered in a mosaic manner.
- Proteins penetrate through the bilayer at a varying degree to form intrinsic and extrinsic proteins
- Intrinsic proteins are those that penetrate through the bilayer while extrinsic proteins are those that float on top as islands in a sea.

(b) How does the structure account for the movement of materials in and out of the cells.

- Lipid soluble substances are freely permeable in the lipid membranes.
- Water soluble substances are facilitated by carrier proteins.
- Ionic substances are taken by active transport through the protein channel
- The phospholipid bilayer can invaginate to form a cup to take in solid or liquid particles that cannot be taken in by diffusion.

7. (2007/2/3) Explain how the epithelial tissue is adapted for its function. (20marks)

In this question structural modification of epithelial tissue to fit different functions are required

- Epithelial tissues serve to protect underlying tissues from mechanical injury, desiccation and chemical injury
- It has compact cells with tight junctions to form an impervious barrier. It is also made in several layers of cells impregnated with keratin in in some part of the body (skin) to increase strength of the cover.
- As absorptive epithelia in the intestine, genital tract contains numerous villi or cilia to increase surface area for absorption.
- Secretory epithelia are packed with secretory substances to secrete mucus or digestive enzyme.
- Some epithelia are modified into exoskeleton structures such as nails, scales, hair, etc.
- Epithelia lining alveoli (squamous epithelia) is thin and single celled to facilitate diffusion of gases.

- Some epithelia have hairy structures that serve as sensory structures for example hair on skin, and in nose detect stimuli.
- Epithelia tissue provide pigmentation to the body for example skin
- Some epithelial tissue makes in-folding in the underlying surface to form channels or ducts which they secrete their substance as glands
- Transitional epithelial found in the renal pelvis, urinary bladder and parts of the urethra has a few layers of flattened cells which are mobile over one another to help in distension of the organ.
- Stratified squamous epithelium is subjected to high forces of wear and tear and has a rapid dividing basal layer of cells that divides and replaces those that die and shed of daily.

8. 1995/2/2

(a) Outline the changes in cell structure, which lead to formation of mature vascular tissues in higher plants.

- Vascular tissues in higher plants develop from vascular cambium.
- Vascular cambium divides mitotically into three layers of cells. The inner layer eventually differentiates into secondary xylem and phloem. The middle layer remains meristematic.
- After cambial division,
 - o Cells destined to form xylem vessel elongate and develop thickened secondary wall. The walls are later lignified. The cell content dies and cross section walls degenerate to form continuous open tube.
 - o Cells destined to become sieve elements elongate, most cell organelles degenerate leaving cytoplasmic filament. The plasmodesmata of the end wall widen forming sieve pores.

(b) Give structural differences between xylem vessels and phloem sieve tubes.

Xylem vessels	Phloem tissues
Are open ended with no cross walls	Cross walls perforated with pits found between cells
Cells are large and wide	Cells very small and narrow
Cells have pits in the walls	Pits occur only on the sieve plate
Cells are dead and contain no cytoplasm	Cells are living and contain cytoplasm
Form annular rings and sclereids	None is formed on the phloem
No companion cells	Have companion cells

(c) State three evidences in support of the phloem as the channel of transport of organic material.

- (i) Ringing experiment show accumulation of materials in the upper part of the ring /girdle on the stem

- (ii) Feeding of aphids and analysis of sap from aphid stylets indicate presence of organic material.
- (iii) Killing the back with steam/poisonous chemicals stops the process of translocation.
- (iv) Use of tracers' technique such as radioactive carbon-14, if radioactive carbon-14 carbon dioxide is used in photosynthesis, products can be traced in photosynthesis.

Answers to the objective type questions

1	B	11	B	21	A	31	A	41	B
2	B	12	D	22	B	32	B	42	B
3	D	13	A	23		33	A	43	D
4	B	14	A	24	B	34	A	44	A
5	A	15	B	25	C	35	A	45	D
6	B	16	D	26	B	36	D	46	D
7	D	17	D	27	D	37	C	47	B
8	C	18	B	28	B	38	D	48	D
9	D	19	C	29	C	39	D	49	D
10	B	20	A	30	C	40	B	50	B
51	B	52	D	53	C	54	D	55	C
56									

6. (a) Describe the structure of plant cell wall

(b) Compare the structures of plant cell wall and plasma membrane

(c) How is the plant cell wall suited for functioning?

2. (a) What is meant by the term **cell organelle**?

(b) Describe the fine structure of the following:

(i) Golgi complex

(ii) Nucleus

(iii) Mitochondrion

(c) How is structure related to functioning in each of the structures in (b) above