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PHYSIOLOGY

Essay Examination

Answer all the following questions:
Start each new question in a new page

1) Describe and explain the ventilatory response to increased CO2 concentration in the inspired air. (10 marks)

2) List the vitamins needed for erythropoiesis. Explain their importance and the effects produced by their deficiency. (10 marks)

3) Describe the origin, distribution and functions of autonomic supply to the pelvic organs. (10 marks)

4) Describe the cardiac responses to exercise. (7 marks)

5) Compare the coronary blood flow in the left ventricle with that of the right ventricle during the cardiac cycle. Summarize the factors that regulate coronary vascular resistance. (8 marks)

6) Biophysics:
State the Poiseuille - Hagen formula for flow in blood vessels. Explain why the radius of a vessel is important determinant of flow. (5 marks)
m.c.q.

Instructions

Please read the instructions before answering the questions:

You should count the number of pages that include the MCQs and problem solving.

Number of pages: 13 pages

Questions will include:

1. Section (A) : MCQs (select a single answer): 50 questions
2. Section (B) : Matching question
3. Section (C) : Graph study
4. Section (D) : Case study
5. Section (F) : Problem solving

Time for MCQs, matching question, graph & case: 90 minutes

Time for Essay: 90 minutes

Oral exam will start exactly at 8:30

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Physiology

Section (A) : MCQs (50 questions) : (50 marks)

Put the correct single answer in capital letter as (A, B, C or D) in the bracket provide in front of each question:

1) If the hydrostatic pressure in a capillary is 10 mm Hg, interstitial pressure is 2 mm Hg, colloid osmotic pressure of plasma is 25 mm Hg and interstitial fluid colloid osmotic pressure is 5 mm Hg. Which of the following is correct for this situation?
   a) filtration with a net pressure of 18 mm Hg.  
   b) filtration with a net pressure of 12 mm Hg.  
   c) reabsorption with a net pressure of 18 mm Hg.  
   d) reabsorption with a net pressure of 12 mm Hg. (   )

2) Oedema can occur from all of the following EXCEPT:
   a) an increase in interstitial fluid pressure
   b) an increase in venous pressure.
   c) a decrease in plasma oncotic pressure
   d) blockage of lymph ducts (   )

3) The mechanism of decrease in the end-systolic volume of the left ventricle with an increase in stroke volume during exercise is the following:
   a) Starling law of the heart
   b) an increase in sympathetic tone to the ventricle
   c) an increase in parasympathetic tone to the ventricle
   d) a decrease in venous return of blood to the heart. (   )

4) Venous return to the heart is increased.
   a) by rise of mean systemic filling pressure.
   b) in anaphylactic shock.
   c) during deep expiration against closed glottis
   d) in pneumothorax (   )
5) Increased baroreceptor discharge
   a) increases the tonic discharge of the vasoconstrictor nerves
   b) inhibits the vagal innervations of the heart
   c) produces vasodilation, venodilation and a drop in BP
   d) induces tachycardia and an increase in COP

6) Regarding pulmonary circulation
   a) contains more than 80% of the individual's blood volume
   b) the ratio of flow in pulmonary artery to flow in the aorta is 1.0
   c) pressure is lower but resistance is higher than in the systemic circulation
   d) capillary pressure is about 30mm Hg

7) Stretch of the atria causes all the following EXCEPT
   a) reflex dilation of the afferent arteriole of the kidney
   b) decrease the secretion of vasopressin (ADH)
   c) increase secretion of ANP
   d) increase secretion of renin

8) The dicrotic notch of the aortic blood pressure curve
   a) is produced by contraction of the left ventricle
   b) is produced by sudden closure of the aortic valve
   c) marks the beginning of the isovolumetric contraction phase
   d) associates with the third heart sound

9) Turbulent flow in an artery is induced by
   a) a decrease in velocity of blood
   b) a decrease in the viscosity of the blood
   c) an increase in hematocrit value
   d) a decrease in diameter of blood vessel

10) In regulation of coronary blood flow (CBF) all the followings are correct, EXCEPT
    a) epicardial coronary arteries respond to changes in aortic pressure and circulating vasoactive substances
    b) precapillary arterioles are the main site for mechanical and myogenic autoregulation
    c) distal precapillary arterioles are the main site of metabolic regulation
    d) the left ventricular coronary BF is increased during tachycardia

11) Regarding the conductive system of the heart
    a) both SAN and AVN are innervated by the left vagus nerve
    b) there is a delay of about 0.2 second at A-V node.
    c) Purkinje fibres have the shortest duration of action potential.
    d) the ventricular muscle has the fastest rate of conduction

12) Excitability of the cardiac muscle is increased in the following conditions, EXCEPT
    a) an increased concentration of K+ in ECF.
    b) decreased concentration of K+ in ECF.
    c) change of Na+ concentration in ECF.
    d) catechoamines

13) Digitalis has positive inotropic effect through the following mechanism:
    a) an increase of intracellular cAMP
    b) activation of voltage-gated calcium channels.
    c) inhibition of Na+-K+ ATPase in the myocardium.
    d) inhibition of ATP-dependent Ca2+ pump in the sarcoplasmic reticulum

14) Sympathetic stimulation to the heart results in:
    a) an increase in the duration of systole
    b) an increase in the duration of diastole.
    c) an increase in the activity of Ca2+ pump in the sarcoplasmic reticulum
    d) a decrease in the affinity of troponin for calcium

15) A patient suffers blood loss over a period of 30 minutes. At the end of this period his arterial blood pressure was 70/50, his heart rate was 145/min, hematocrite was 35%. Which of the following conditions would not be expected to occur in this situation?
    a) an increased total peripheral resistance.
    b) an increased plasma colloid osmotic pressure.
    c) a decreased capillary hydrostatic pressure.
    d) an increased catecholamine secretion
16) The baroreceptor reflex involves the following:
   a) baroreceptors discharge at arterial pressure above 120 mm Hg and reaches maximum at 300 mm Hg
   b) increased tonic discharge of vasconstrictor centre to arterioles and venules.
   c) excitation of vagal innervations to the heart.
   d) increased secretion of vasopressin (ADH).

17) Stimulation of angiotensin II receptors AT1 produces all the following effects, EXCEPT:
   a) vasoconstriction.
   b) aldosterone secretion.
   c) diuresis and natriuresis.
   d) renal Na+ and water reabsorption.

18) In Cushing reflex all the followings are correct, EXCEPT:
   a) rise of intracranial pressure.
   b) rise of arterial blood pressure.
   c) acceleration of the heart.
   d) increase of tonic discharge of sympathetic vasoconstrictor fibres.

19) Cerebral blood flow:
   a) is almost constant when the arterial blood pressure is in the range of 50-190 mm Hg.
   b) is about 750ml/min. at rest.
   c) is controlled mainly by sympathetic innervations.
   d) decreases when there is a high arterial PCO2.

20) Cardiovascular responses to isotonic (dynamic exercise) include an increase of the followings, EXCEPT:
   a) cardiac output.
   b) heart rate.
   c) total peripheral resistance.
   d) oxygen consumption.

21) With time, blood stored in a blood bank tends to become depleted of 2,3-DPG. What effect does this have on the hemoglobin oxygen dissociation curve?
   a) shift the curve to right, so that the haemoglobin has increased oxygen affinity.
   b) shift the curve to the right, so that the haemoglobin has a decreased oxygen affinity.
   c) shift the curve to the left, so that the haemoglobin has an increased oxygen affinity.
   d) shift the curve to the left, so that the haemoglobin has a decreased oxygen affinity.

22) The airway resistance is reduced by:
   a) a blockade of β2-adrenergic receptors.
   b) increase in airway CO2.
   c) stimulation of parasympathetic cholinergic fibers.
   d) release of histamine.

23) The peripheral chemoreceptors increase their rate of discharge primarily in response to:
   a) a decrease in blood oxygen content.
   b) a decrease in the partial pressure of blood oxygen.
   c) a decrease in dissolved oxygen in cerebral spinal fluid.
   d) an increase in percent saturation of hemoglobin with oxygen.

24) Which of the following characterizes the systemic arterial blood of an individual suffering from carbon monoxide poisoning?
   a) low haemoglobin, low O2 content, low Po2.
   b) low haemoglobin, low O2 content, normal Po2.
   c) normal haemoglobin, low O2 content, low Po2.
   d) normal haemoglobin, low O2 content, normal Po2.

25) Which of the following statements describes the interaction of respiratory centres in brain and their effect on respiration?
   a) sectioning the brain and their effect on respiratory arrest.
   b) the apneustic and pneumotaxic centres of the pons are essential for the basic rhythm of respiration.
   c) sectioning of the afferent vagal nerve results in deep and slow respiration.
   d) rhythmicity of the medullary centres is abolished when the brain stem is transacted above this area.
26) If surfactant is absent from the alveoli:
   a) airway resistance will decrease.
   b) lung compliance will decrease
   c) O2 diffusion capacity will increase.
   d) lung recoil will decrease. (   )

27) A 25-year old man received a penetrating stab injury to his left chest in the third intercostal space. X-ray on chest showed a pneumothorax. Air entry in the pleural sac results in:
   a) lung to collapse inward and chest wall to collapse inward.
   b) lung to collapse inward and chest wall to expand outward.
   c) lung to expand outward and chest wall to expand inward.
   d) both lung and chest wall to expand outward. (   )

28) The venous blood has:
   a) higher hematocrite value than arterial blood.
   b) lower bicarbonate.
   c) higher pH.
   d) Po2 tension which equals 100 mm Hg. (   )

29) Cyanosis:
   a) can be seen in a person if his capillary blood contains 5 mg reduced hemoglobin per 100 ml blood.
   b) is observed in histotoxic hypoxia.
   c) is seen in carbon monoxide poisoning.
   d) is present in severe ventilation perfusion imbalance. (   )

30) Peripheral and central chemoreceptors are stimulated simulatenously as a result of:
   a) a decrease in arterial oxygen content.
   b) a decrease in arterial oxygen tension.
   c) an increase in arterial carbon dioxide tension.
   d) an increase in arterial pH. (   )

31) Which of the following is higher at the apex of the lung than at the base in standing position?
   a) blood flow.
   b) lung compliance.
   c) V/Q ratio.
   d) Pco2. (   )

32) A 20-year medical student participates in exercise study.
   * The respiratory rate = 20 breaths/min.
   * Tidal volume = 1000 ml.
   * Dead space = 150 ml.
   The student's alveolar ventilation is:
   a) 7 liters.
   b) 10 liters.
   c) 17 liters.
   d) 3 liters. (   )

33) Coughing:
   a) is initiated by irritation of the alveoli.
   b) is associated with relaxation of airways smooth muscle.
   c) depends on contraction of the diaphragm.
   d) differs from sneezing in that the glottis is initially close. (   )

34) Intravenous lactic acid increases ventilation. The receptors for this effect are located in the:
   a) medulla oblongata.
   b) lung alveoli.
   c) carotid bodies.
   d) aortic baroreceptors. (   )

35) The slow twitch muscle fiber differs from the fast fiber in that the former:
   a) has a smaller number of muscle fibers in each motor unit.
   b) is more readily fatigued.
   c) has a higher ATPase activity.
   d) has a higher concentration of myoglobin and nitrochondria. (   )
36) Motor end plate potential is
   a) reversal of charge originating through the end plate and propagated throughout the muscle fiber.
   b) a local depolarization that is propagated throughout the muscle.
   c) a local decrease in the membrane potential that is caused by an increased permeability to Na+ and K+
   d) a local decrease in the membrane potential that is caused by an increased permeability to Ca++

37) During an isometric contraction
   a) intracellular free calcium is lower than under resting conditions.
   b) tropinin - bound calcium is required to maintain active tension.
   c) ATPase activity of the sarcoplasmic reticulum is inhibited.
   d) the Na+ - K+ ATPase pump activity is inhibited.

38) Regarding skeletal muscle, the following is true, EXCEPT:
   a) contraction occurs when Ca++ is released from the sarcoplasmic reticulum.
   b) twitch tension has a time course similar to the time course of the action potential.
   c) twitch tension is maximum at an initial length equal to the resting length.
   d) the amount of tension generated can be altered by altering the frequency of stimulation.

39) Local response:
   a) is a state of passive depolarization at the cathode.
   b) is accompanied by increased excitability.
   c) obeys all or non law.
   d) can propagate and generate another local response within a distance of 3-4 cm.

40) Compound action potential:
   a) obeys all or non law.
   b) can be graded.
   c) is the action potential recorded from stimulation of a single myelinated nerve fiber by supramaximal stimulus.
   d) is a biphasic action potential.

41) Prolonged duration of smooth muscle contraction compared with skeletal muscle is due to:
   a) proper arrangement of action and myosin.
   b) greater amount of myosin present in smooth muscle.
   c) slower uptake of Ca2+ ions following contraction.
   d) slower cycling of myosin cross-bridges of smooth muscle.

42) In periodic familial paralysis:
   a) nerve excitability is increased.
   b) nerve is depolarized.
   c) nerve is hyperpolarized.
   d) acetylcholine is rapidly inactivated by choline esterase.

43) Postganglionic parasympathetic nerves:
   a) arise from the brain and sacral segments of the spinal cord.
   b) are myelinated.
   c) are longer than preganglionic parasympathetic fibres.
   d) can lead to excessive intestinal movement if they are stimulated.

44) Atropine blocks the action of acetylcholine on receptors located in the following areas, EXCEPT:
   a) the gastric glands secreting HCl.
   b) sinoatrial node.
   c) motor end plate.
   d) iris.

45) Norepinephrine:
   a) is the chemical transmitter at all sympathetic postganglionic endlings.
   b) represent 80% of the secretion of the adrenal medulla.
   c) acts equally on both a and B adrenergic receptors.
   d) acting on presynaptic adrenergic nerve endings to inhibit secretion of the chemical transmitter.
46) Deficiency of coagulation factor number VIII:
   a) is due to an abnormal gene on the Y chromosome.
   b) increases the bleeding time.
   c) affects the intrinsic, rather than the extrinsic pathway for blood coagulation.
   d) causes thrombocytopenic purpura.

47) The hormone erythropoietin:
   a) increases the life span of erythrocytes.
   b) acts on reticulocytes to convert them to erythrocytes.
   c) regulates the production of erythrocyte, thrombocytes and granulocytes.
   d) stimulates the maturation of stem cells to proerythroblast.

48) Immunoglobulin M:
   a) is produced in large amounts in the primary immune response.
   b) has the highest concentration in the plasma.
   c) includes Rh antibodies.
   d) can cross the placenta.

49) Regarding T-cytotoxic (Tc) cells, the followings are true, EXCEPT:
   a) contain CD8 that helps the interaction between T-cells and APC.
   b) recognize the antigen accompanied by MHC-II
   c) cause lysis of the malignant cells by secreting perforins.
   d) are responsible for rejection of transplants of foreign tissues.

50) In Horner's syndrome there is:
   a) lesion of oculomotor nerve on one side.
   b) dilatation of the pupil on the affected side.
   c) drooping of the upper eye lid on the affected side.
   d) decreased salivary secretion.
2. Point 1 represents
   a) Mean arterial blood pressure.
   b) Mean systemic filling pressure.
   c) Mean atrial pressure.
   d) Atrial pressure during systole.

3. The units at 2 on the curve represent:
   a) Rt atrial pressure mmHg.
   b) Rt atrial pressure cm water.
   c) Venous return ml/min.
   d) Venous return L/min.

4. Explain the cause of the plateau phase of the curve.

5. Mention 2 causes of shift of the curve upwards.
   a. ..............................................................
   b. ..............................................................

Section (D) : Case study (5 marks)

Hoda is a 20-year-old college graduate. Over the last 6 months she complained of extreme eye strain (fatigue) when she read for longer than 15 min. She became tired when she chewed food or dried her hair. She was diagnosed with Myasthenia gravis. She immediately felt better when she took prostigmine (anticholine esterase). Antibody test confirmed the diagnosis of myasthenia gravis.

Questions:
1. List the steps involved in neuromuscular transmission.
   ...............................................................
   ...............................................................

Section (E) : Problem solving (10 marks)

Use the following cardiovascular values provided in the table below to answer the questions that follow:

<table>
<thead>
<tr>
<th>Systolic pressure</th>
<th>130 mmHg</th>
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</thead>
<tbody>
<tr>
<td>Diastolic pressure</td>
<td>70 mmHg</td>
</tr>
<tr>
<td>Left ventricular end-diastolic volume</td>
<td>125 ml</td>
</tr>
<tr>
<td>Left ventricular end-systolic volume</td>
<td>55 ml</td>
</tr>
<tr>
<td>Left atrial pressure</td>
<td>5 mmHg</td>
</tr>
<tr>
<td>Right atrial pressure</td>
<td>2 mmHg</td>
</tr>
<tr>
<td>Mean pulmonary artery pressure</td>
<td>20 mmHg</td>
</tr>
<tr>
<td>O₂ consumption (whole body)</td>
<td>240 ml/min</td>
</tr>
<tr>
<td>O₂ content of systemic arterial blood</td>
<td>0.19 ml/ml</td>
</tr>
<tr>
<td>O₂ content of pulmonary arterial blood</td>
<td>0.152 ml/ml</td>
</tr>
</tbody>
</table>
Questions:
1. Use Fick principle to calculate cardiac output.
   ........................................................................................................................
   ........................................................................................................................
2. Calculate ejection fraction and explain its clinical importance.
   Ejection fraction = .............................................................................
   clinical importance : ..........................................................................
   ........................................................................................................................
3. State the equation that describes the relationship between : ABP, COP and TPR.
   ........................................................................................................................
4. Mention the two determinants of TPR
   a) ....................................................................................................................
   b) .......................................................................................................................
5. Calculate TPR and pulmonary vascular resistance.
   ........................................................................................................................
   ........................................................................................................................
6. Compare the site of resistance of the systemic circulation with that of pulmonary circulation.
   ........................................................................................................................
   ........................................................................................................................

PHYSIOLOGY
Essay Examination
Answer all the following questions:
Start each new question in a new page
1) Describe the origin, course, distribution and functions of autonomic supply to the eye. (5 marks)
2) List the specific respiratory functions of the vagus nerves and describe their role in the regulation of respiration. (10 marks)
3) Describe the structure and functions of the platelets and explain their role in hemostasis. (8 marks)
4) Summarize the factors that help the venous return against gravity. (5 marks)
5) List factors that influence the cardiac output and explain the effect of each. (10 marks)
6) a- Discuss the factors that permit gradation of skeletal muscle responses in a living intact animal. (2 marks)
   b- Explain the factors that affect excitability of the nerve. (5 marks)
7) Biophysics:
   Describe the Starling forces that determine the net movement of fluid across the capillary wall. Mention causes of oedema (5 marks)
Physiology
Essay Examination

Answer the following questions:
Start each new question in a new page

1) Describe the Starling forces that determine the net movement of fluid across the capillary wall. Summarize causes of edema. (10 marks)

2) Describe the genesis of rhythmic breathing. (7 marks)

3) Define ventilation/perfusion (VA/Q) ratio and describe the distribution of blood through the lungs of an upright subject. Explain how does this distribution affect the VA/Q. (8 marks)

4) Describe the mechanism and properties of neuromuscular transmission. (10 marks)

5) Summarize the mechanisms of blood coagulation when a blood vessel is injured. (10 marks)

6) Biophysics:
Describe the relationship between flow, pressure and resistance in the vascular system. Mention the factors that affect total peripheral resistance. (5 marks)

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Section (A) : MCQs (50 questions)

Put the correct single answer in capital letter as (A, B, C or D) in the bracket provide in front of each question:

1- Pneumothorax due to a penetrating stab wound in the right side of the chest may lead to:
   a) collapse of the right lung.
   b) expansion of the right lung.
   c) bulging out of left chest wall.
   d) collapse of the right chest wall.

2- Which of the following would cause the shift represented by curve X in the above diagram of O2-Hb dissociation curves?
   a) drop in body temperature.
   b) an increase in arterial Pco2.
   c) an arterial pH of 7.5.
   d) a decrease in blood 2, 3 diphosphoglycerate (2, 3 DPG).

3- Normally, as the alveolar Po2 is increased from 105 mmHg to 950 mmHg, the amount of oxygen:
   a) dissolved in plasma increases, amount associated with hemoglobin remains almost constant.
b) dissolved in plasma increases, amount associated with hemoglobin decreases.
c) dissolved in plasma remains constant, amount associated with hemoglobin increases.
d) dissolved in plasma remains constant, amount associated with hemoglobin remains constant.

4- A patient with severe pulmonary fibrosis is evaluated by her physician and has following arterial blood gases: pH=7.48, Po2 = 55 mmHg and Pco2=32 mmHg. Which statement best explains the observed value of Pco2?
   a) the increased pH stimulates breathing via peripheral chemoreceptors.
   b) the increased pH stimulates breathing via central chemoreceptors.
   c) the decreased Po2 stimulates breathing via peripheral chemoreceptors.
   d) the decreased Po2 stimulates breathing via central chemoreceptors.

5- Stimulation of which of the following receptors should result in decreased ventilation?
   a) central chemoreceptors.
   b) Hering - Breuer stretch receptors.
   c) aortic chemoreceptors.
   d) carotid chemoreceptors.

6- Which of the following responses would be expected in a normal person after 6 days of residence at an altitude of 20,000 feet?
   a) normal arterial Pco2.
   b) increased plasma bicarbonate.
   c) decreased hematocrit value.
   d) alveolar ventilation greater than at sea level.

7- P50 of oxygen hemoglobin dissociation curve is increased in the following condition:
   a) increased blood levels of 2, 3 - DPG.
   b) an increase blood pH (alkalosis).
   c) a decrease in body temperature.
   d) carbon monoxide poisoning.

8- An otherwise normal subject has lost blood to decrease his body's hemoglobin concentration from 15 gm/dL to 12 gm/dL blood. Which of the following would be expected to decrease?
   a) arterial Po2.
   b) arterial oxygen content.
   c) percentage saturation of hemoglobin with O2.
   d) O2 dissolved in physical solution.

9- Regarding surfactant, the following statements are true, EXCEPT:
   a) it is formed by type II alvolar epithelium.
   b) it decreases the surface tension of the fluid lining the alveoli.
   c) its deficiency will will decrease the work of breathing.
   d) it decreases in hyaline membrane disease of premature baby.

10- The residual volume is:
    a) the air remaining in the lung after maximal inspiration.
    b) a dynamic lung volume.
    c) measured directly using spirometer.
    d) measured by dilution method.

11- Causes of decreased diffusing capacity of the lungs include all of the following, EXCEPT:
    a) alveoli-capillary block.
    b) inhalation of 100% O2.
    c) emphysema.
    d) pulmonary oedema.

12- Medullary inspiratory neurons are stimulated by:
    a) afferent impulses from proprioceptors.
    b) vagal afferent from lung stretch receptors.
    c) increased hydrogen ion concentration in arterial blood.
    d) afferent impulses from arterial baroreceptors.
13- Destruction of the pneumotaxic centre and cutting of the vagus nerves lead to:
   a) apnea.
   b) hyperventilation.
   c) periodic breathing.
   d) apneusis.

14- Regarding cyanosis, all are true, EXCEPT:
   a) is more likely in a person with a high than with a low Hb level.
   b) is produced when there is at least 5 gms of reduced Hb/100 ml capillary blood.
   c) is seen in histotoxic type of hypoxia.
   d) when it is central in origin the tongue is also affected.

15- Peripheral and central chemoreceptors are stimulated simultaneously as a result of:
   a) a decrease in arterial oxygen content.
   b) a decrease in arterial oxygen tension.
   c) an increase in arterial carbon dioxide tension.
   d) an increase in arterial pH.

16- Peripheral resistance is:
   a) increased in patients affected by anemia.
   b) inversely proportional to the arteriolar diameter.
   c) decreased during isometric exercise.
   d) decreased in patients affected by atherosclerosis.

17- Concerning nitric oxide (NO), the following are true statements, EXCEPT:
   a) is formed from L-arginine by the action of NO synthase.
   b) it causes VSMs relaxation b activating guanyl cyclase.
   c) acetylcholine and shear stress increases the activity of NO synthase.

18- A decrease in the carotid sinus pressure from 100 mmHg will lead to:
   a) an increase in the frequency impulses from arterial baroreceptors.
   b) a reflex stimulation of cardiac sympathathetic nerves.
   c) a reflex stimulation of cholinergic postganglionic nerves.
   d) an increase of venous capacitance.

19- Regarding cerebrospinal fluid (CSF), the following are true, EXCEPT:
   a) formation is dependent on intranventricular pressure.
   b) lumbar CSF pressure is about 100 mmHg.
   c) its protein content is about 20 mg/dL.

20- Regarding the circulatory response to exercise, the following are true, EXCEPT:
   a) isotonic exercise causes significant increases in both cardiac output and systemic vascular resistance.
   b) static exercise is characterized by an increase in systemic vascular resistance and blood pressure with minimal change in cardiac output.
   c) resistance exercise causes both volume and pressure loads to the heart.
   d) cardiac output may increase by 7 folds in trained athletes.

21- Low resistance shock:
   a) occurs when the size of the vascular system is increased by vasodilatation of arterioles and capillaries.
   b) is characterized by an increase of the venous return.
   c) skin is cold and pale in septic shock.
   d) is characterized by hypotension and tachycardia in vasovgal syncope.

22- The following data were collected from an individual:
   * Pulse rate = 100 beats/min
   * B.P. = 120/80
   * Oxygen consumption = 1500 ml/5 min.
   * Pulmonary artery O2 content = 14 ml/100 ml.
   * Aortic artery O2 content = 20 ml/100 ml.
27- The a wave of jugular venous pulse:
   a) is caused by sudden closure of A-v valves.
   b) coincides with the first heart sound.
   c) is recorded in atrial fibrillation.
   d) is prominent when the ventricular pressure is high.

28- Exchange between blood and interstitidal fluid across capillary wall:
   a) is decreased when pre-capillary sphincters dilate.
   b) occurs mainly by diffusion.
   c) bulk flow is responsible for exchange of protein molecules between blood and interstititial fluid.
   d) is generally easier through continuous capillary wall.

29- Right atrial pressure (central venous pressure):
   a) is higher in standing position.
   b) when elevated, venous return increases.
   c) decreased right atrial pressure decreases the secretion of vasopressin.
   d) is a good index of blood volume.

30- Concerning the cardiac output, which of the following statements is WRONG?
   a) is increased when the heart rate increases above 200/min.
   b) is increased after venoconstriction.
   c) is increased during sympathetic stimulation.
   d) is decreased after rise of right atrial pressure.

31- Which of the following statements about the control of the peripheral circulation and blood pressure is true:
   a) the sudden assumption of an upright posture increases venous return.
   b) the sudden assumption of an upright posture results in tachycardia.
   c) the central vasomotor center is situated in hypothalamus.
   d) the arterioles account for about 90% of total peripheral resistance.
32- The diastolic blood pressure will increase:
  a) markedly with an increase in stroke volume.
  b) in cases of anemia.
  c) with an increase in arteriolar diameter.
  d) with tachycardia.

33- In pulmonary circulation:
  a) lungs offer a lower resistance to the flow of blood as compared to systemic circulation.
  b) pulmonary blood pressure = 120/80 mmHg.
  c) resistance to the flow of blood is same in pulmonary and systemic circulation.
  d) hypoxia causes pulmonary vasodilation.

34- Formation of an excess interstitial fluid can be caused by all of the following, EXCEPT:
  a) hypoproteinemia.
  b) heart failure.
  c) lymphatic obstruction.
  d) Arteriolar constriction.

35- Concerning regulation of the coronary blood flow the following is true:
  a) a-adrenergic stimulation produces coronary vasodilatation.
  b) stimulation of the vagal fibers to the heart dilates coronary vessels.
  c) coronary blood flow in the left ventricle is maximal during isovolumetric relaxation phase.
  d) coronary flow is increased 10 times during exercise.

36- The equilibrium potential for an ion across the cell membrane:
  a) is directly proportional to the concentration gradient of the ions on the 2 sides of the membrane.
  b) is the same for Na+ and K+ ions in the resting nerve.
  c) is the same for Na+ and K-+ ions in the resting nerve.
  d) for Na+ equal-86 mV.

37- In excitation contraction coupling:
  a) attachment of ATP to myosin heads in essential for detachment of myosin from actin.
  b) Ca2+ released from sarcoplasmic reticulum binds to tropomyosin to expose active sites on actin myofilaments.
  c) Ca2+ is actively pumped out of muscle fiber into T-tubules to initiate relaxation.
  d) myosin - ATPase activation is dependent on an increase of intracellular Mg2+.

38- Myosin light chain kinase:
  a) is essential for initiation of cardiac muscle contractin in response to Ca2+ influx from ECF.
  b) is important regulatory protein in skeletal muscle.
  c) attaches phosphate group to the myosin light chains necessary for cross-bridge cycling in smooth muscle.
  d) terminates contractin of smooth muscle by removing phosphate group from myosin light chain.

39. A lower motor neuron supplying skeletal muscle:
  a) is unmyelinated.
  b) conducts impulses at a speed of 2m/sec.
  c) innervate fewer fibres in hand muscle than one innervating a leg muscle.
  d) is present in the lateral horn of the spinal cord.

40- Regarding conduction of action potential along a nerve fiber:
  a) propagation of action potential requires ATP.
  b) large myelinated nerve fibers conduct faster than unmyelinated nerve fibers.
  c) saltatory conduction is associated with slowing of action potential propagation.
  d) the action potential magnitude declines as it propagates along the nerve fiber.
41- The alarm response is accompanied by all of the following, EXCEPT:
   a) high level of circulating adrenaline.
   b) hypotension.
   c) pupillo-dilatation (mydriasis).
   d) rise of blood glucose level.

42- Regarding nicotinic cholinergic receptors, all of the following is true, EXCEPT:
   a) they are present at the motor end plate.
   b) they are blocked by atropine.
   c) are found in the suprarenal medulla.
   d) are members of ligand-gated ion channels.

43- Administration of a drug that blocks β-adrenergic receptors would be expected to produce all the following, EXCEPT:
   a) dilation of the bronchioles.
   b) decrease of the heart rate.
   c) decrease of myocardial contractility.
   d) lowering of the arterial blood pressure.

44- Regarding adrenergic receptors:
   a) a1- receptors produce their effects through increasing cAMP.
   b) a2 receptors present in the heart increase force of myocardial contractility.
   c) β-receptors produce their effect by increasing cAMP.
   d) stimulation increases sweat secretion.

45- In Horner’s syndrome there is:
   a) lesion of occulomotor nerve on one side.
   b) dilatation of the pupil on the affected side.
   c) drooping of the upper eye lid on the affected side.
   d) decreased salivary secretion.

46- Iron absorption:
   a) occurs mainly in the stomach.
   b) occurs in the ferrous state.
   c) is facilitated by presence of excess phytic acid in the diet.
   d) depends on intrinsic factor secreted by the stomach.

47- Vitamin K deficiency:
   a) may be caused by its lack in diet.
   b) occurs in obstructive jaundice.
   c) results in deficiency of fibrinogen.
   d) is accompanied by prolonged bleeding time.

48- Hereditary methemoglobinemia is caused by:
   a) exposure to strong reducing agents.
   b) presence of hemoglobin S instead of hemoglobin A.
   c) cyanide poisoning.
   d) absence of NAD-H methemoglobin reductase.

49- A blood count of a man aged 50 years gave the following picture: Bh 12gm/dL, RBCs 3 millions/mm3 and MCV of 97u3. The following statement about the findings is true:
   a) the findings are typical of one living at high altitudes.
   b) the finding are typical of vitamin B12 deficiency.
   c) the finding are typical of iron deficiency anemia.
   d) the blood would carry about 10 ml O2/dL blood.

50- Basophils:
   a) constitute 2-6% of the total leucocytic count.
   b) are increased in parasitic infection.
   c) are involved in anaphylactic shock and urticaria.
   d) are weak phagocytic and show chemotaxis.
Section (B) : Matching items question :
Theme : Immunity
Options :
A. Natural killer cells (NK) B. T helper cells CD4
C. Cytotoxic T cells CD8 D. Complement
E. Ig M F. Ig A
G. Interfero H. Cluster differentiation CD

For each of the descriptions below choose the most appropriate option from the list above. Each option may be used once, more than once or not at all.
1. Antibodies formed in primary immune response
2. Recognize the antigen accompanied by MHCII
3. Glycoprotein molecule that help interaction between T-cell and APCs
4. Protein released by virus infected cells and used in treatment of cancer
5. Non-T, non-B lymphocytes considered first line of defense against viral infected cells.

Section (c) :
curves below (1, 2 and 4) represent changes in lung volumes and pulmonary pressures during quiet normal breathing (eupnea).

Complete the following :
1. Represents changes during one respiratory cycle. It equals ............. .
2. Represents changes in during quiet inspiration it becomes ..................
3. 2-equals zero at ................. , and .................
4. 4-represents changes in during coughing it becomes ..................
3-represents changes in ....................... it is considered as the ....................... of the lungs.

Section (D) :
Left ventricular and aortic pressure tracing below were recorded during cardiac catherization of 50-year-old patient.

Complete the following :
i. Curve (A) represents pressure changes, while Curve (B) represents pressure changes.
ii. From the above record, select the proper NUMBER(S) PROVIDED (FROM 1 TO 8), which coincide with different phases of cardiac cycle.
1. Ventricular systole coincides with phases ..............................................
2. Phases during which ventricular volume is constant ................................

...
3. Locate the phases during which different heart sounds can be recorded.
   * S1 during phase .......................  
   * S2 during phase .......................  
   * S3 during phase .......................  
   * S4 during phase .......................  
4. Main ventricular filling occurs in phase ..................................  
5. Maximum coronary flow occurs during phase ........................}

**Section (E) : Case study**

A 40-year-old man suffering from severe hemorrhage caused by a road traffic accident was brought to the ICU at Kasr El-Eini hospital. He was very pale, cold, very anxious, restless and thirsty, and his pulse was weak. Table below shows his blood pressure and heart rate in the lying (supine) position. Hematocrite value was 30%.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Lying down</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood pressure</td>
<td>60/30 mmHg</td>
</tr>
<tr>
<td>Heart rate</td>
<td>150 beat/min</td>
</tr>
</tbody>
</table>

Immediately following infusion of 2 L of blood, his blood pressure rose to 110/70, his heart rate slowed to 100 beats/min and his skin color had returned to normal.

**Questions :**
1. How did this blood loss lead to decreased arterial pressure?  
2. Explain the mechanism that elevated his heart rate following blood loss.  
3. Give reason for the following observations :
   a- Skin was pale and cold.  
   b- Hematocrite value was decreased.  
   c- The patient was restless and anxious.  
4. If central venous pressure had been measured, would you expect their values to have been increased, decreased, or the same as in a healthy person?  
5. Mention three hormones that are increased in the blood and help to restore extracellular fluid (ECF) volume. Mention the action of each.  
   a- ....................... It's action is .......................  
   b- ....................... . Its action is .......................  
   c- ....................... . Its action is .......................  

Cairo University  
Faculty of Medicine  
First Year  

**Physiology**

**Essay Questions**

**Answer all the following questions :**  
**Start each new question in a new page**

1. Enumerate factors affecting erythropoiesis, discuss role of Vitamin B12 and iron in detail. (8 marks)  
2. Discuss functions of the vagus nerve in abdomen. (8 marks)  
3. Explain chloride shift phenomena. (10 marks)  
4. Describe ionic basis of ventricular action potential. (10 marks)  
5. Explain factors that effect blood flow in the blood vessel. (8 marks)  

* Biophysics  
6. Explain law of Laplace, Give two examples for its operation in the body. (6 marks)
First Year - Anatomy Final Exam (Part I)

Illustrate your answer with diagrams whenever possible:

Answer the following questions: (60 marks)

1. Give an account on the course, relations and branches of the median nerve in the forearm and the hand. (10 marks)

2. Write a short account on each of the following:
   A. Attachments, nerve supply and action of the deltoid muscle. (5 marks)
   B. Answer either a or b:
      a. Connection between arteries and veins. (5 marks)
      b. Attachments of skeletal muscles. (5 marks)

3. Give an account on the boundaries and contents of the femoral triangle. (10 marks)

4. Write a short account on:
   A. Cruciate ligaments of the knee joint. (5 marks)
   B. Sinuses of the pericardium. (5 marks)

5. Give an account on the course, relations and branches of the descending thoracic aorta. (10 marks)

6. Give a short account on only two of the following: (10 marks)
   A. Normal and abnormal sites of implementation.
   B. Paraxial mesoderm.
   C. Chorionic villi.
(Part II)

A) Fill in the Blanks : (10 marks)

1. The cubital fossa is bounded laterally by the ................. muscle and medi-
   ally by the ............................................. muscle.

2. The ............... nerve passes between the two heads of the pronator teres, while
   the ............... nerve passes between the two heads of the flexor carpi ulnaris.

3. The lateral two lumbricals are supplied by the ................. nerve, while
   the medial two lumbricals are supplied by the ............... nerve.

4. The rectus femoris can ............ the hip joint and can ............ the knee joint.

5. The pubic part of adductor magnus is supplied by the ............... nerve
   while its ischial part is supplied by the ............... nerve.

6. The dorsalis pedis artery lies between the tendons of ............... and .............

7. The internal thoracic artery ends by dividing into ............... and ............ arteries.

8. Recesses of the pleura are ............... and ............... arteries.

9. The interventricular septum is supplied by the ............... and the ........... arteries.

10. Each somite differentiates into a ventromedial part called .................
    and a dorsolateral part called .................

B) Matching : (20 marks)

I. Upper limb

Select from column (B) the muscle supplied by the nerve in column (A) :

<table>
<thead>
<tr>
<th>Column (A)</th>
<th>Column (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ulnar nerve.</td>
<td>a- Brachioradialis.</td>
</tr>
<tr>
<td>2. Musculocutaneous nerve</td>
<td>b- Pronator teres.</td>
</tr>
<tr>
<td>3. Long thoracic nerve</td>
<td>c- Flexor carpi ulnaris.</td>
</tr>
<tr>
<td>4. Median nerve</td>
<td>d- Coracobrachialis.</td>
</tr>
<tr>
<td>5. Radial nerve</td>
<td>e- Seratus anterior.</td>
</tr>
</tbody>
</table>

II. Lower limb

Match the origin of the following arteries :

<table>
<thead>
<tr>
<th>The artery</th>
<th>The origin</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Superior gluteal.</td>
<td>a- Femoral artery.</td>
</tr>
<tr>
<td>2. Superficial epigastric.</td>
<td>b- Profunda femoris artery.</td>
</tr>
<tr>
<td>3. Peroneal.</td>
<td>c- Internal iliac artery.</td>
</tr>
<tr>
<td>5. Medial circumflex femoral.</td>
<td>e- Anterior tibial artery</td>
</tr>
</tbody>
</table>

III. Thorax

Concerning the surface anatomy match the column (A) with the column (B) :

<table>
<thead>
<tr>
<th>Column (A)</th>
<th>Column (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mitral valve.</td>
<td>a- Left 3rd intercostal space.</td>
</tr>
<tr>
<td>2. Pulmonary valve</td>
<td>b- Left 4rd sternocostal junction.</td>
</tr>
<tr>
<td>3. Aortic valve.</td>
<td>c- Left 3th sternocostal junction</td>
</tr>
<tr>
<td>4. Tricuspid valve</td>
<td>d- Left 5th intercostal space</td>
</tr>
<tr>
<td>5. Apex of heart.</td>
<td>e- Left 4th intercostal space behind the centre of the sternum.</td>
</tr>
</tbody>
</table>
IV. Embryology

Select from the column (B) the derivative of the structures in the column (A):

<table>
<thead>
<tr>
<th>Column (A)</th>
<th>Column (B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Neuroectoderm.</td>
<td>a- epithelial lining of the respiratory tract.</td>
</tr>
<tr>
<td>2. Surface ectoderm.</td>
<td>b- Kidneys.</td>
</tr>
<tr>
<td>3. Paraxial mesoderm.</td>
<td>c- Central nervous system.</td>
</tr>
<tr>
<td>4. Endoderm.</td>
<td>d- Dermis of the skin.</td>
</tr>
</tbody>
</table>

C- M.C.Q. : (20 marks)

Choose only one answer:

1. The following arteries share in the anastomosis around the scapula EXCEPT:
   a) Suprascapular artery.
   b) Subscapular artery.
   c) Circumflex scapular artery.
   d) Deep branch of transverse cervical artery.
   e) Circumflex humeral artery.

2. The tendons of all the following muscles belong to the rotator cuff of the shoulder joint EXCEPT:
   a) Supraspinatus.
   b) Infraspinatus.
   c) Subscapularis.
   d) Teres major.
   e) Teres minor.

3. Inability to abduct the arm from 15 to 90 degrees results from injury of:
   a) Radial nerve.
   b) Axillary nerve.
   c) Long thoracic nerve.
   d) Musculocutaneous nerve.
   e) Ulnar nerve.

4. All the following muscles receive double innervation EXCEPT:
   a) Pectoralis major.
   b) Subscapularis.
   c) Brachialis.
   d) Flexor digitorum profundus.
   e) Flexor digitorium superficialis.

5. The following structures pass superficial to the flexor retinaculum EXCEPT:
   a) Ulnar nerve.
   b) Ulnar artery.
   c) Palmaris longus tendon.
   d) Median nerve.
   e) Palmar cutaneous branch of the median nerve.

6. Concerning the palmar arterial arches, all the following statements are correct EXCEPT:
   a) The superficial palmar arch is the continuation of the ulnar artery.
   b) The deep palmar arch is the continuation of the radial artery.
   c) The superficial palmar arch passes between the tendons of the flexor digitorum superficialis and profundus.
   d) The deep branch of the ulnar nerve lies in the concavity of the deep palmar arch.
   e) The deep branch of the ulnar nerve lies in the concavity of the deep palmar arch.

7. Concerning the adductor (subsartorial) canal, all the following statements are correct EXCEPT:
   a) It begins at the apex of the femoral triangle.
   b) It ends at the adductor hiatus.
   c) Its lateral wall is formed by the vastus medialis.
   d) Its posterior wall is formed by the adductor brevis.
   e) It transmits the saphenous nerve.
8. All the following structures pass through the sciatic foramen EXCEPT:
   a) Superior gluteal nerve and vessels.
   b) Obturator internus tendon.
   c) Inferior gluteal nerve and vessels.
   d) Sciatic nerve.
   e) Pudendal nerve.

9. Concerning the hamstring muscles, all the following statements are correct EXCEPT:
   a) They are supplied by the sciatic nerve.
   b) They can flex the knee and extend the hip.
   c) The upper half of the semimembranosus is membranous.
   d) The lower half of the semitendinosus is formed of a long tendon.
   e) The biceps femoris produces medial rotation of the knee.

10. Regarding the popliteal artery, all the following statements are correct EXCEPT:
    a) It begins at the opening of the adductor magnus.
    b) It ends at the lower border of the popliteus muscle.
    c) It is the deepest structure in the poplitetal fossa.
    d) Its pulsations can be felt while the knee is extended.
    e) It gives five genicular branches.

11. Regarding the great saphenous vein, all the following statements are correct EXCEPT:
    a) It begins at the medial end of the dorsal venous arch.
    b) It passes behind the medial malleolus.
    c) It has many valves.
    d) It ends in the femoral vein.
    e) It runs most of its course in the superficial fascia.

12. Regarding the ankle joint, all the following statements are correct EXCEPT:
    a) It is a synovial joint of the hinge variety.
    b) Formed by the articulation of the talus and the distal ends of the tibia and fibula.
    c) It is supported medially by the deltoid ligament.
    d) It is supported laterally by spring ligament.
    e) It receives nerve supply from the anterior and posterior tibial nerves.

13. Regarding the lungs, all the following statements are correct EXCEPT:
    a) The right lung is shorter and broader than the left one.
    b) The left lung has two lobes.
    c) The right lung has a cardiac notch.
    d) The left lung is related to the descending aorta.
    e) The right lung is related to the arch of the azygos.

14. Regarding the pleura, all the following statements are correct EXCEPT:
    a) The parietal pleura is supplied by the intercostal and phrenic nerves.
    b) The visceral pleura is not sensitive to pain.
    c) Pleural cavity is the space between visceral and parietal pleurae.
    d) Plunomary ligament allows the distension of the pulmonary veins.
    e) The inferior border of the pleura reaches the 8th rib in the midaxillary line.

15. Regarding the thoracic part of the trachea, all the following statements are correct EXCEPT:
    a) Its wall is supported by 16-20 C shaped cartilages.
    b) It ends at the level of the third thoracic vertebra.
    c) It is related posteriorly to the oesophagus.
    d) It is crossed by the arch of the aorta.
    e) The left subclavian artery lies on its left side.
16. Concerning the heart, all the following statements are correct EXCEPT:
   a) the sternocostal surface is formed mainly by the right ventricle.
   b) The base is formed mainly by the left atrium.
   c) The apex is formed of both ventricles.
   d) The left atrium receives four pulmonary veins.
   e) The left ventricular wall is usually three times thicker than that of the right ventricle.

17. The right ventricle contains all the following statements are correct EXCEPT:
   a) Pectinate muscles.
   b) Chordae tendinae.
   c) Trabeculae carneae.
   d) Papillary muscles.
   e) Moderator band (septomarginal trabecula).

18. Which of the following cells contains a haploid number of chromosomes?
   a) Primary oocyte.
   b) Primary spermatocyte.
   c) Somatic skin cell.
   d) Spematid.
   c) Zygote.

19. All the following structures are endodermal derivatives EXCEPT:
   a) Liver.
   b) Pancreas.
   c) Thyroid gland.
   d) Stomach.
   e) Kidney

20. Regarding the full term placenta, all the following statements are correct EXCEPT:
   a) Has a discoid shape.
   b) Its diameter is 15 to 25 cm.
   c) Its weight is 500 to 600 gm.
   d) The maternal surface is smooth and covered by amnion.
   e) The umbilical cord is attached near the centre of the fetal surface.

D) Problem solving questions: (15 marks)

1. A 45 years old man fell on his left elbow. X-ray examination revealed fracture in the medial epicondyle of the humerus.
   Give an answer for each of the following questions:
   a) Which nerve was affected?
   b) From which cord it arises?
   c) Name the muscles in the forearm supplied by this nerve.
   d) Name two cutaneous branches arising from this nerve in the forearm.
   e) Name the resulting hand deformity.

2. A patient was transferred to the hospital with a history of trauma to the lateral side of the right knee. Radiological examination revealed fracture neck of fibula. On examination the patient was unable to perform dorsiflexion and eversion of his right foot.
   Give an answer for each of the following questions:
   a) Which nerve was affected?
   b) Give the origin of the affected nerve.
   c) Why the patient cannot perform dorsiflexion and eversion of his right foot?
   d) Name the cutaneous branches of the affected nerve.
   e) Name the resulting deformity.

3. A man arrived to the hospital with difficulty of respiration. X-ray examination revealed fluid in the pleural cavity.
   Give an answer for each of the following questions:
   a) What is the name of this condition?
   b) Name the different parts of the pleura.
   c) Give the nerve supply of its parts.
   d) Name the condition if pus accumulates in the pleural cavity.
   e) Name the condition if blood accumulates in the pleural cavity.
(Part I) (60 Marks)

Illustrate your answers with diagrams whenever possible:

Answer the following questions:

1. A Enumerate arteries anastomosing at the elbow. (5 Marks)
   B. Course and branches of median nerve in the forearm. (5 Marks)

2. A. Attachments and actions of biceps brachii muscle. (5 Marks)
   B. Answer either a or b:
   a. Classify joints according to axes of movements, give examples.
   b. Shape of skeletal muscles.

3. A. Enumerate boundaries and contents of popliteal fossa. (5 Marks)
   B. Attachments, actions, and nerve supply of sartorius muscle. (5 Marks)

4. A. Enumerate branches of profunda femoris artery. (5 Marks)
   B. Surface anatomy of cardiac valves. (5 Marks)

5. A. Origin, course and tributaries of azygos vein. (5 Marks)
   B. Course and branches of internal thoracic artery. (5 Marks)

6. A. Answer two only of the following
   A. Abnormal sites of implantation. (5 Marks)
   B. Abnormalities of the placenta. (5 Marks)
   C. Notochord. (5 Marks)

(Part II) Fill in the blanks: (10 Marks)

1. The deltoid muscle is supplied by ............... nerve, it is inserted into ............... .

2. The median nerve passes between the two heads of ............... muscle while the ulnar nerve passes between the two heads of ............... muscle.

3. The thenar muscles are supplied by ............... nerve while the hypothenars are supplied by the ............... nerve.

4. The rectus femoris can ............... the hip joint and can ............... the knee joint.

5. The obturator internus muscle is supplied by ............... nerve while the obturator externus is supplied by ............... nerve.

6. The posterior tibial artery terminates as ............... and ............... arteries.

7. The left coronary artery gives ............... and ............... branches.

8. Sinuses of pericardium are ............... and ............... .

9. The interior of right atrium shows openings of ............... and ............... .

10. The life span of the sperm is ............... hours while that of the ovum is ............... hours.

(Part III) Matching (20 Marks)

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Nerve supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Serratus anterior</td>
<td>A. Circumflex nerve</td>
</tr>
<tr>
<td>2. Rhomboideus major</td>
<td>B. Dorsal scapular nerve</td>
</tr>
<tr>
<td>3. Teres minor</td>
<td>C. Long thoracic nerve</td>
</tr>
<tr>
<td>4. Teres major</td>
<td>D. Medial &amp; lateral pectoral nerves</td>
</tr>
<tr>
<td>5. Extensor carpi ulnaris</td>
<td>E. Lower subscapular nerve.</td>
</tr>
<tr>
<td></td>
<td>F. Ulnar nerve.</td>
</tr>
<tr>
<td></td>
<td>G. Radial nerve.</td>
</tr>
</tbody>
</table>
Nerve | Root value
---|---
1. Femoral nerve. | A. L1
2. Obturator nerve | B. L1,2
3. Medial popliteal nerve. | C. Ventral divisions of L2,3,4
4. Lateral popliteal nerve. | D. Dorsal divisions of L2,3,4
5. Lateral cutaneous nerve of the thigh | E. L4,5 S1,2,3
| F. L4,5 S1,2
| G. Dorsal division of L2,3

Artery | Branches
---|---
1. Ascending aorta | A. 3 arteries to upper limbs and head & neck.
2. Arch of aorta | B. Right and left branches.
3. Descending aorta | C. Bronchial arteries.
4. Pulmonary trunk | D. Coronary arteries.
5. Drachiocephalic artery | E. Left common carotid & left subclavian.
| F. Right common carotid & right subclavian
| G. Internal thoracic artery

Structure | Time of formation
---|---
1. Morula | A. Fourth week.
2. Blastocyst | B. Third week.
3. Formation of bilaminar disc | C. Third day.
4. Formation of trilaminar disc | D. Fifth day.
5. Folding of the embryo | E. Second week.
| F. First week

(Part IV) M.C.Q. (20 Marks)

1. One of the following ligaments is not attached to the clavicle:
   a) the interclavicular ligament
   b) the costoclavicular ligament
c) the suprascapular ligament
d) the anterior sternoclavicular ligament
e) the coracoclavicular ligament

2. One of the following structures is not connecting radius to ulna:
   a) annular ligament
   b) brachialis muscle
c) intersosseous membrane
d) supinator muscle
e) flexor digitorum superficialis muscle

3. These muscles share in forming walls of axilla except:
   a) serratus anterior
   b) subscapularis
c) supraspinatus
d) pectoralis major
e) pectoralis minor

4. All these nerves are branches from the medial cord of the brachial plexus except:
   a) musculocutaneous nerve
   b) medial pectoral nerve
c) medial root of the median nerve
d) medial cutaneous nerve of arm
e) ulnar nerve

5. The ulnar nerve supplies all these muscles except:
   a) first dorsal interosseous
   b) first lumbrical
c) flexor digiti minimi
d) adductor pollicis
e) flexor carpi ulnaris

6. One of the following statements about the flexor retinaculum is incorrect:
   a) attached to pisiform & hook of hamate bones
   b) splits into two laminae from its aleral side
c) gives origin to thenars and hypothenar
d) overlies all tendons, arteries and nerves proceeding to the palm
   e) tendon of flexor carpi radialis passes between the two laminae

7. One of the following statements about the primary curves of the vertebral column is incorrect:
   a) is present in the thoracic and sacral regions
   b) is convex forwards
   c) appears in fetal life
   d) persists after birth
   e) is caused by the flexure attitude of the fetus in the uterus

8. Concerning the intercostal muscles one of the following is incorrect:
   a) are supplied by the intercostal nerves
   b) the neurovascular plane lies between the external & innermost intercostals
c) the external intercostals are attached to the upper borders of ribs below
d) external intercostal muscles elevate the ribs
e) internal intercostal muscles depress the ribs

9. Concerning the pleura, one of the following is incorrect:
   a) drainage of any accumulated fluid in the pleural sac is done in the midclavicular line
   b) pyothorax means pus in the pleural cavity
c) pneumothorax means air in the pleural cavity
d) pleural effusion means accumulation of watery fluid in the pleural cavity
e) hemothorax means presence of blood in the pleural cavity

10. One of the following nerves does not pass superficial to the arch of the aorta:
    a) left vagus
    b) left phrenic
c) left recurrent laryngeal nerve
d) superior cervical cardiac branch of the left sympathetic chain
e) inferior cervical cardiac branch of left vagus
Part I : Essay Questions : (60 marks)

1. A. Shape (form) of skeletal muscles. (5 marks)
   B. Attachments, nerve supply and actions of Latissimus dorsi muscle. (5 marks)

2. A. Course, branches of median nerve in the forearm. (5 marks)
   B. Course, relations of right phrenic nerve in the thorax. (5 marks)

3. A. Origin, course and end of azygos vein. (5 marks)
   B. Course, relations of right phrenic nerve in the thorax. (5 marks)

4. A. Surface anatomy of the heart. (5 marks)
   B. Attachments, nerve supply and actions of adductor magnus muscle. (5 marks)

5. A. Origin, course, end and injury of common peroneal nerve. (Do not discuss its terminal branches) (5 marks)
   B. Longitudinal arches of the foot. (5 marks)

6. A. Abnormalities of the placenta. (5 marks)
   B. Notochord. (5 marks)

Part II : M.C.Qs: (40 marks)

Select the inappropriate statement:

1. The scapula:
   a) acromion is felt of the tip of the shoulder.
   b) costal surface is divided by the spine.
   c) crest of the spine is felt on the back.
   d) medical border is subcutaneous.
   e) the primary center of ossification appears of 8th week of intra-uterine life.

2. Muscles attached to medial border of the scapula:
   a) serratus anterior muscle.
   b) trapezius muscle.
   c) levator scapulae muscle.
7. The female breast:
   a) extends from the 2nd to the 6th ribs.
   b) its tail pierces deep fascia of axilla.
   c) nipple & areola darkens in pregnancy.
   d) lies in the deep fascia of the chest.
   e) its main lymph drainage is to the pectoral group of axillary lymph nodes.

8. Concerning the axilla:
   a) posterior wall is formed by subscapularis, feres major and latissimus dorsi.
   b) medial wall is the most dangerous wall surgically.
   c) pus in the axilla may point to the apex.
   d) lateral wall is the narrowest of the four walls.
   e) posterior fold is formed by latissimus dorsi and feres major muscles.

9. Branches of posterior cord of brachial plexus:
   a) radial nerve.
   b) nerve to serratus anterior muscle.
   c) upper and lower subscapular nerves.
   d) circumflex nerve.
   e) nerve to latissimus dorsi.

10. The brachial artery:
    a) the direct continuation of axillary artery.
    b) terminates of level of neck of radius.
    c) is not the main supply of the arm.
    d) begins at the outer border of 1st lib.
    e) has two vene comitantes along its sides.

11. The hypothenar muscles:
    a) three short muscles of the little finger.
    b) all supplied by the unlar nerve.
    c) have origin from tubercle of scaphoid.
    d) abductor muscle lies along the medial side of the flexor one.
    e) opponents muscle lies deep to both abductor and flexor.
12. Ulnar nerve supplies following muscles:
   a) first dorsal interosseous.
   b) first dorsal interosseous.
   c) flexor digiti minimi.
   d) adductor pollicis.
   e) flexor carpi unlaris.

13. Concerning the primary curvature of the vertebral column:
   a) present in the thoracic and sacral regions.
   b) convex forwards
   c) appears in fetal life.
   d) persists off birth.
   e) caused by the flexure attitude of the fetus in the uterus.

14. Concerning the first rib:
   a) gives origin to subcalvius muscle.
   b) gives attachment to suprapleural membrane.
   c) frequently fractured.
   d) has groove for subcalvian artery.
   e) its outer border gives origin to the 1st digitation of serratus anterior muscle.

15. The following are branches of internal thoracic artery:
   a) anterior intercostal arteries to upper 6 spaces.
   b) posterior intercostal arteries to upper 6 spaces.
   c) perforating branches to 2,3,4 spaces.
   d) superior epigastric.
   e) musculophrenic.

16. The parietal pleura has the following parts:
   a) costai.
   b) diaphragmatic.
   c) mediastinal.
   d) suprapleural.
   e) cervical.

17. Contents of hilum of lung are:
   a) branchus.
   b) lower pulmonary vein.
   c) upper pulmonary vein.
   d) branchial vessels.
   e) pulmonary ligament.

18. Nerves passing through thoracic inlet:
   a) right and left vagi.
   b) right and left phrenic nerves.
   c) right recurrent laryngeal nerve.
   d) left recurrent laryngeal nerve
   e) right and left sympathetic trunks.

19. The pulmonary trunk:
   a) lies at its origin, anterior to ascending aorta.
   b) lies within serous pericardium with the ascending aorta.
   c) bifurcates anterior to the aortic arch.
   d) related to the left lung and pleura.
   e) closely related to both right and left coronary arteries.

20. The ligamentum arteriosum is the obliterated:
   a) distal part of pulmonary artery.
   b) proximal part of ascending aorta.
   c) sinus venosus.
   d) proximal part of azygos vein.
   e) ductus arteriosus.

21. Thoracic part of symphathetic chain:
   a)0 passes through thoracic inlet.
   b) continuation of the cervical part.
   c) leaves the thorax deep to the medial arcuate ligament.
   d) slows the heart beats.
   e) gives splanchnic nerves.
22. Structures passing through esophageal opening of the diaphragm:
   a) esophagus.
   b) esophageal branches of the left gastric artery.
   c) anterior gastric nerve.
   d) posterior gastric nerve.
   e) thoracic duct.

23. Concerning the obturator foramen:
   a) obturator canal lies in its upper part.
   b) transmits nerve to obturator internus.
   c) partially filled by the obturator membrane.
   d) triangular in females.
   e) reduces weight of the pelvis.

24. The lower end of the femur:
   a) has medial and lateral condyles.
   b) the two condyles are separated posteriorly by intercondylar notch.
   c) the patellar surface lies anteriorly.
   d) each condyle has a conical epicondyle.
   e) the adductor tubercle lies above lateral condyle.

25. The tibia:
   a) can be fractured easily.
   b) inferior tibiofibular joint is a fibrous joint.
   c) superior tibiofibular joint is a synovial joint.
   d) the lateral surface is subcutaneous.
   e) soleal line cuts the posterior surface obliquely.

26. The fibula:
   a) gives attachment to biceps tendon.
   b) related to tibial nerve at its neck.
   c) gives attachment to soleus muscle.
   d) shares in formation of ankle joint.
   e) provides a pulley for the peroneal tendons.

27. The great saphenous vein:
   a) the longest vein in the body.
   b) begins on the lateral side of dorsum of foot.
   c) runs anterior to medial malleolus.
   d) enters the femoral vein through the saphernous opening.

28. The obturator nerve:
   a) arises from ventral divisions of L 2,3,4.
   b) enters the thigh through the obturator canal.
   c) its posterior division pierces the obturador externus muscle.
   d) supplies the gracilis muscle.
   e) its anterior division descends between the adductor longus and magnus.

29. The piriformis muscle:
   a) arises inside the pelvic cavity.
   b) its tendon passes in lesser sciatic foramen.
   c) rotates the thigh laterally.
   d) has the sciatic nerve at its lower border.
   e) inserted into greater trochanter of femur.

30. The popliteal artery:
   a) the continuation of the femoral artery.
   b) begins at junction of middle & lower thirds of thigh.
   c) ends at the upper border of popliteus muscle.
   d) crossed from lateral to medial by popliteal vein.
   e) gives muscular and genicular branches.

31. The tibialis anterior muscle:
   a) has an attachment to all cuniform bones.
   b) supplied by the deep peroneal nerve.
   c) dorsiflexes the foot.
   d) has an attachment to first metatarsal bone.
   e) inverts the foot.
32. The plantar aponeurosis:
   a) formed of dense collagen fibers.
   b) divides into 5 slips.
   c) reinforced by transverse fibers.
   d) adherent to the flexor digitorum brevis.
   e) thicker on the medial and lateral aspects.

33. The capsule of the hip joint:
   a) attached along the whole of the inter-trochanteric crest.
   b) attached along the intertochanteric line.
   c) thickened anteriorly as the iliofemoral ligament.
   d) adherent to the flexor digitorum brevis.
   e) the iliofemoral ligament stabilizes the joint in extension.

34. Concerning action of tendocalcaneus:
   a) takes the heel off the ground.
   b) gives the limb a propulsive push during walking.
   c) plantar flexes the ankle.
   d) supports the medial longitudinal arch.
   e) raises the body on tips of toes.

35. The aim of spermaogenesis:
   a) reduction of the chromosomal number.
   b) changing the shape of male germ cells.
   c) changing the germ cell into motile animal.
   d) determination of sex.
   e) storage of the cytoplasm in the sperms.

36. The serectory phase of uterine cycle:
   a) lasts about 10 days.
   b) endometrium increases very much in thickness.
   c) uterine glands become filled with glycogen & mucin.
   d) endometrial arteries become very tortuous.
   e) under the influence of progesterone.

37. Concerning the decidua:
   a) is the endometrium after fertilization.
   b) consists of three parts.
   c) the decidua parietalis forms the maternal part of the placenta.
   d) the decidua capsularis covers the fertilized ovum.
   e) the decidua basalis lies between the embryonic pole and myometrium.

38. Concerning the extraembryonic mesoderm:
   a) develops from the mesodermal germ layer.
   b) begins to be formed on 11th and 12th days.
   c) lies on the inner surface of the cytotrophoblast.
   d) formed of loose tissue.
   e) forms with the cytotrophoblast the chorion.

39. The derivatives of the neural crest:
   a) neurilemmal sheath cells.
   b) adrenal cortex.
   c) dorsal root ganglia.
   d) sensory ganglia of the cranial nerves.
   e) sympathetic ganglia.

40. Concerning the allantois:
   a) an endodermal protrusion.
   b) arises from the cranial part of the yolk.
   c) opens into the terminal part of the hid.
   d) its extraembryonic part will be obliterated.
   e) its intraembryonic part forms apex of urinary bladder.

Part II : Problem Solving Questions : (25 marks)

Problem 1:
A 44-year-old woman was subjected to operation on her breast as she was suffering of cancer breast. The axillary lymph nodes were removed.
Problem 2:
A 52-year-old heavy smoker consulted his physician about an alteration of his voice, severe loss of weight, a persistent cough and blood-stained sputum. A distorted tracheal carina was observed during bronchoscopy. The radiograph of his chest revealed the diagnosis of bronchogenic carcinoma in the upper lobe of the left lung.
A. Where would cancer cells from the tumor spread?
B. What superficial lymph nodes would be enlarged and palpated.
C. Clarify the bronchopulmonary segments of the upper lobe of the left lung.
D. What would be the cause of the alteration of his voice?
E. What caused distortion of the carina of the trachea.

Problem 3:
A ten-year-old girl was taken to the doctor wrapped in a blanket, shivering, and with a fever 41 degrees. Her respiration was very rapid and accompanied with severe pain in the right side of her chest. On examination there was also pain around the umbilicus. On radiograph there was a picture of pneumonia with right pleural effusion.
A. What is the function of the pleura?
B. What is the difference between pleurisy and pleural effusion?
C. How is fluid removed from the pleural sac?
D. Why was there pain around the umbilicus?
E. Is there any possibility of pain at the top of right shoulder?

Problem 4:
A 50-year-old woman complained of a globular swelling in her upper thigh just inferior to her inguinal ligament. A physical examination revealed that the swelling was a femoral hernia.
A. What is the position of the saphenous opening relative to the pubic tubercle?
B. Why is this relationship important in the differential diagnosis of hernia?
C. Define the term femoral ring.
D. Define the term femoral canal.
E. Why is femoral hernia more frequent in women than men?

Problem 5:
In a football game, a runner's knee was hit strongly from the lateral side by another player. As he lay on the ground clutching his knee, it was obvious from his face that he was in severe pain. While he was being helped to the sidelines, his coach said: "I am afraid that he has unhappy knee triad!"
A. Which is the first ligament of the knee to be affected in such case?
B. Which is the second structure to be affected if the blow was much stronger?
C. Which is the third structure to be affected if the blow was much more stronger?
D. What does the name unhappy knee triad mean?
E. Explain how this injury occurs.
Anatomy Exam. (First year)

Part I : Essay Questions (60 marks)

Give a short account on each of the following :

1. A. Stability of joints. (5 marks)
   B. Attachments, nerve supply and actions of sarratus antrior muscle. (5 marks)

2. A. Course and branches of radial nerve in the ar (5 marks)
   B. Enumerate arteries which anastomose at the wrist joint. (5 marks)

3. A. Origin, termination and branches of internal thoracic artery. (5 marks)
   B. Relations and branches of left vagus in the thorax. (5 marks)

4. A. Surface anatomy of the right lung. (5 marks)
   B. Attachments, nerve supply and actions of popliteus muscle. (5 marks)

5. A. Origin, surface anatomy and branches of the femoral artery. (5 marks)
   B. Ligaments and relations of the hip joints. (5 marks)

6. A. Define the neural crest and enumerate its derivatives. (5 marks)
   B. Results of folding.

Part II. MCQ : (40 marks)

Part III : Problem Solving Questions (25 marks)

Problem 1 :
A man who sells fish visited the doctor suffering of tingling sensation over the lateral 3 1/2 fingers. During examination, the doctor found that the sensation of the palm was not affected but there was slight weakness of the thenar muscles. The doctor told his patient that there was some sort of nerve compression.

a. What nerve compressed?
b. What is the name of nerve compression syndrome?
c. What is the possible cause of nerve compression in this particular case?
d. What other conditions that can cause compression of this nerve?
e. Why there wasn't sensory affection over the palm?

Problem 2 :
A young man was stabbed by a long bladed knife, the knife penetrated the 4th intercostals space along the left sternal border. By the time he was taken to the hospital, the patient was semiconscious and gasping for breath. In a few moments he became unconscious and died.

a. What organs would you expect to be punctured by the knife?
b. Was the lung injured? Why?
c. Where would the blood likely accumulate?
d. What are the causes of the shock then death?
e. What is the surface anatomy of the aortic valve?

Problem 3 :
A 55-year-old man was admitted to the hospital from severe pain in the chest, radiating to the left shoulder and arm. The condition was diagnosed as angina.

a. What is the site of apex beat?
b. What might be the affected arteries?
c. Give their origin?
d. Name two main branches of each artery?
e. What is the main venous channel draining the affected organ?

Problem 4 :
During a football match, a player was kicked on the lateral surface of the knee. He felt pain but he could walk with difficulty and pain. On radiograph there was fracture of the ehad of the fibula.

a. How would you palpate the head of the fibula?
b. What bony landmark would you use?
c. Which part of the upper end of the bone is related to an important nerve?
   What is this nerve?
d. What is the effect of injury of this nerve?
e. The patient was able to walk with difficulty and pain; explain.

Problem 5 :
A 50-year-old man complained of a globular swelling in his right groin. He stated that the swelling became smaller when he lay down but never completely disappear. He also stated taht the mass occasionally became large and associated with pain down the ghig.

a. Define the term femoral hernia.
b. What are the contents of the femoral sheath?
c. Explian why a femoral hernia curves superiorly.
d. Why strangulation of this type of hernia is common?
e. Enlargement of what structure in the femoral canal might be mistaken for a femoral hernia?
Final First Year Examination in Medical Biochemistry

Answer the following questions:

1. What is meant by (Answer four of the following): (8 marks)
   a) cDNA
   b) DNA-dependent RNA polymerase
   c) Reverse transcriptase
   d) Promotor
   e) Protoocogen

2. Describe five of the following processes: (15 marks)
   a) Cis-acting regulatory mechanisms of gene expression.
   b) Mechanisms of gene remodeling in eukaryotes.
   c) Apoptosis secondary to extracellular factor(s).
   d) Post-transcriptional intron excision and splicing of exons. Give a disease condition related to this process.
   e) Mismatch repair. Give a disease condition due to failure of this process.
   f) Mis-sense mutation of B-globin gene. Describe pre-natal laboratory diagnosis technique for this condition.

3. Explain how tumor markers are used for diagnosis, follow-up and screening of tumors. Illustrate your answer with examples. (6 marks)

4. Enumerate three compounds containing each of the following.
   a) Choline
   b) Glucuronic acid
   c) sphingosine
   Give the structure of one of three compounds. (9 marks)

5. Describe the steps of synthesis and maturation of collagen. (5 marks)
   Explain hydroxylation of proline and lysine residues, and its importance. (2 marks)

6. What is meant by buffers? (0.5 mark)
   Describe their mode of action. Illustrate your answer with an example. (1.5 marks)

7. What is the class of each monosaccharide of the following? Give its reduced product(s). (3 marks)
   a) Fructose
   b) Ribose
   c) Glyceraldehyde
V. What is meant by only 4 of the following:  
1. Mutarotation.  
2. Telomerase.  
3. Promoter.  
5. Rancidity.

VI. Describe only two of the following:  
1. Remodeling of chromatin gene in eukaryotes.  
2. Types of environmentally induced DNA errors (mutations).  
3. Lipids of cell membranes and their functions.

Answer the following questions: (12 marks)

I. Enumerate only four of the following:  
1. Three types of DNA polymerases used for DNA replication in eukaryotes and mention the role of each.  
2. Three examples of post-transcriptional processing of RNA and mention the importance of each. 
3. Two aromatic, two acidic amino acids and two imino acids. 
4. Three examples of tumor markers and mention the importance of each.  
5. Three GAGs containing uronic acid and mention one importance for each. 

II. What are the hydrolytic products of only three of the following: (6 marks)  
1. Sphingomyelin  
2. N-acetyl neuraminic acid  
3. Glutathione  
4. Inosinic acid

III. Explain why? Answer three only: (6 marks) 
1. Lactose is a reducing while sucrose is a non reducing disaccharide. 
2. Puromycin inhibits protein translation. 
3. Exposure of the cells to stress affects protein synthesis. 
4. Globin part of hemoglobin is essential for hemoglobin function.

IV. Diagrammatically illustrate the detailed structures and names of only two of the following: (10 marks) 
1. Transfer RNA (tRNA).  
2. Immunoglobulins.  
3. DNA replication fork in prokaryotes.
5. As regards membrane fluidity:
   a) It increases with increased saturated fatty acids.
   b) It increases by cholesterol at low temperature.
   c) It depends mainly on the carbohydrate content of the membrane.
   d) It depends mainly on the protein content of the membrane.

6. One of the following is a phosphorportien:
   a) Casein
   b) Lecithin
   c) Phosphatidylserine
   d) Phosphatidylethanolamine

7. As regards the light (L) chain of immunoglobulins:
   a) Its N-terminal has a constant sequence of amino acids.
   b) Its C-terminal has a variable sequence of amino acids.
   c) It is composed of about 200 amino acids.
   d) None of the above.

8. One of the following is not an alcohol:
   a) Sorbitol
   b) Cholesterol
   c) Glycerol
   d) Heparin

9. Vectors are:
   a) Used for DNA cloning.
   b) Inserted on DNA forming a chimeric molecule.
   c) Include plasmids, phages or cosmids.
   d) All of the above.
10. Nucleotides found in DNA include all the following except:
   a) dUMP
   b) dGMP
   c) dAMP
   d) dTMP

11. One of the following is a marker for liver cancer:
   a) Alpha-fetoprotein (AFP)
   b) CA15-3
   c) CA19-9
   d) Carcinoembryonic antigen (CEA)

12. The initiating codon of mRNA is usually:
   a) AUG and it codes for methionine.
   b) UAA and it codes for methionine.
   c) UAG and it codes for methionine.
   d) UGA and it codes for cysteine.

13. As regards copper, all are true except that it is:
   a) A component of cytochrome oxidase.
   b) Important for myelin sheath formation.
   c) Important for normal glucose utilization.
   d) Present in plasma in the form of ceruloplasmin.

14. By hydrolysis, all the following give glucose units except:
   a) Inulin
   b) Isomaltose
   c) Cellulose
   d) Maltose

15. Addition or deletion of one or two nucleotides results in:
   a) Sense mutation.
   b) Silent mutation.
   c) Frame-shift mutation.
   d) Nonsense mutation.

16. The most efficient physiological buffer system is:
   a) Hemoglobin system.
   b) Phosphate system.
   c) Bicarbonate system.
   d) Protein system.

17. As regards RNA, all the following are true except:
   a) It contains uracil.
   b) It consists of a single strand.
   c) It contains xanthine.
   d) It is important for protein synthesis.

18. A nucleotide is converted into nucleoside by removal of:
   a) Purine base
   b) Pyrimidine base
   c) Pentose
   d) Phosphate

19. As regards the amino acid glycine:
   a) It is optically inactive.
   b) It has a large molecular diameter.
   c) It is hydrophilic, basic and charged.
   d) It is hydrophilic, acidic and charged.
20. One of the following statements describes the double helical structure of DNA:

<table>
<thead>
<tr>
<th>Choice</th>
<th>Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>it is a left handed double helix.</td>
</tr>
<tr>
<td>b)</td>
<td>The hydroxyl groups of pentoses are involved in linkages between the two helices.</td>
</tr>
<tr>
<td>c)</td>
<td>The two strands are parallel running in the same direction.</td>
</tr>
<tr>
<td>d)</td>
<td>Nitrogenous bases are perpendicular to the long axis of the helix.</td>
</tr>
</tbody>
</table>

21. The step that leads to release of the polypeptide chain from tRNA is catalyzed by:

<table>
<thead>
<tr>
<th>Choice</th>
<th>Reaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) UAA</td>
<td>Peptidyl transferase.</td>
</tr>
<tr>
<td>b)</td>
<td>Releasing factors.</td>
</tr>
<tr>
<td>c)</td>
<td>Stop codons.</td>
</tr>
</tbody>
</table>

22. Glucose and galactose are:

<table>
<thead>
<tr>
<th>Choice</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Aldopentoses</td>
</tr>
<tr>
<td>b)</td>
<td>Ketohexoses</td>
</tr>
<tr>
<td>c)</td>
<td>Epimers</td>
</tr>
<tr>
<td>d)</td>
<td>Non-reducing monosaccharide.</td>
</tr>
</tbody>
</table>

23. All the following amino acids are not involved in protein structure except:

<table>
<thead>
<tr>
<th>Choice</th>
<th>Amino Acid</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Homoserine</td>
</tr>
<tr>
<td>b)</td>
<td>Leucine</td>
</tr>
<tr>
<td>c)</td>
<td>Homocystiene</td>
</tr>
<tr>
<td>d)</td>
<td>Ornithine</td>
</tr>
</tbody>
</table>

24. All the following are components of 43S preinitiation complex except:

<table>
<thead>
<tr>
<th>Choice</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>IF-2 and GTP.</td>
</tr>
<tr>
<td>b)</td>
<td>Met-tRNA</td>
</tr>
<tr>
<td>c)</td>
<td>IF-4</td>
</tr>
<tr>
<td>d)</td>
<td>40S ribosomal subunit</td>
</tr>
</tbody>
</table>

25. During DNA replication, the sequence of 5’ TAGA 3’ will produce:

<table>
<thead>
<tr>
<th>Choice</th>
<th>Sequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>5’ TCAT 3’</td>
</tr>
<tr>
<td>b)</td>
<td>5’ UCUA 3’</td>
</tr>
<tr>
<td>c)</td>
<td>5’ ATCT 3’</td>
</tr>
<tr>
<td>d)</td>
<td>5’ TCTA 3’</td>
</tr>
</tbody>
</table>

26. All the following contain fructose except:

<table>
<thead>
<tr>
<th>Choice</th>
<th>Sugar</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Sucrose</td>
</tr>
<tr>
<td>b)</td>
<td>Inulin</td>
</tr>
<tr>
<td>c)</td>
<td>Rafinose</td>
</tr>
<tr>
<td>d)</td>
<td>Lactose</td>
</tr>
</tbody>
</table>

27. As regards zinc, all are true except that it is:

<table>
<thead>
<tr>
<th>Choice</th>
<th>Property</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>A component of carbonic anhydrase.</td>
</tr>
<tr>
<td>b)</td>
<td>Important for healing of wounds.</td>
</tr>
<tr>
<td>c)</td>
<td>Important for insulin storage in pancreas.</td>
</tr>
<tr>
<td>d)</td>
<td>An essential component of cytochrome oxidase.</td>
</tr>
</tbody>
</table>

28. Hydrotropic substances include all the following except:

<table>
<thead>
<tr>
<th>Choice</th>
<th>Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Bile salts.</td>
</tr>
<tr>
<td>b)</td>
<td>Phospholipids.</td>
</tr>
<tr>
<td>c)</td>
<td>Long chain fatty acids.</td>
</tr>
<tr>
<td>d)</td>
<td>Soap</td>
</tr>
</tbody>
</table>

29. The synthesis of a certain protein requires all except:

<table>
<thead>
<tr>
<th>Choice</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>A ribosome</td>
</tr>
<tr>
<td>b)</td>
<td>mRNA</td>
</tr>
<tr>
<td>c)</td>
<td>Amino acids</td>
</tr>
<tr>
<td>d)</td>
<td>Okazaki fragments</td>
</tr>
</tbody>
</table>

30. Basic amino acids include:

<table>
<thead>
<tr>
<th>Choice</th>
<th>Amino Acid(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Tryptophan and phenylalanine.</td>
</tr>
<tr>
<td>b)</td>
<td>Alanine and glycine</td>
</tr>
<tr>
<td>c)</td>
<td>Histidine, arginine and lysine.</td>
</tr>
<tr>
<td>d)</td>
<td>Valine, leucine and isoleucine</td>
</tr>
</tbody>
</table>
31. Stop codons include all the following except:
   a) UAA
   b) UAG
   c) AUG
   d) UGA

32. Hydrogen peroxide (H2O2) is a potent ROS produced by:
   a) Xanthine oxidase.
   b) Aldehyde oxidase.
   c) Aromatic oxidases.
   d) All of the above

33. Immunoglobulin M (IgM) is characterized by all the following except:
   a) Its level increases in allergic patients.
   b) It is produced in primary response to an antigen.
   c) It represents about 6% of the total plasma immunoglobulins.
   d) It is the first immunoglobulin to appear in blood of infants.

34. One of the following is not a hemoprotein:
   a) Myoglobin
   b) Catalase
   c) Cytochrome oxidase
   d) Ceruloplasmin

35. As regards Rho (p) factor, all the following are true except:
   a) It is protein in nature.
   b) It has ATPase activity.
   c) It is important for initiation of transcription.
   d) It helps dissociation of RNA from DNA.

36. All the following contain choline except:
   a) Lecithin
   b) Cardiolipin
   c) Sphingomyelin
   d) Lung surfactant

37. Replicatin is characterized by:
   a) It is semiconservative.
   b) It requires DNA polymerases.
   c) The two newly synthesized strands grow in opposite directions.
   d) All of the above.

38. Enhancers are characterized by all the following except that they can:
   a) Work when arranged in 5' to 3' to 5' directions.
   b) Work when present upstream or downstream from the transcription unit.
   c) Activate replication in eukaryotes.
   d) Act on more than one gene.

39. During replication, DNA supercoiling is solved by:
   a) Topoisomerase I and II.
   b) DNA polymerase I and II.
   c) Helicase
   d) Primase

40. DNA polymerase III in prokaryotes is important for:
   a) Synthesis of leading DNA strand.
   b) Transcription
   c) Separation of the two DNA strands.
   d) Synthesis of mitochondrial DNA.

41. All the following are unsaturated fatty acids except:
   a) Arachidonic acid
   b) Oleic acid
   c) Palmitic acid
   d) Palmitoleic acid
42. Affinity of hemoglobin to oxygen is affected by:
   a) CO2 concentration.
   b) Hydroxylysine content of a-chain.
   c) 2,3 Bisphosphoglycerate.
   d) a and c

43. Simple proteins include all the following except:
   a) Albumins and globulins.
   b) Glutelins.
   c) Hemocyanin
   d) Keratin

44. Amino acid sequence in the a-chains of tropocollagen can be represented by:
   a) (Gly- X- Y)333
   b) (Gly- X- Y)100
   c) (Serine- X- Y)333
   d) Serine- X- Y)100

45. Eukaryotic replication differs from prokaryotic in:
   a) Presence of one origin of replicatin in eukaryotes.
   b) shorter Okazaki fragments in eukaryotes.
   c) Longer RNA primer in eukaryotes.
   d) b and c

46-50 Match the correct Statements
   a) Transcription  46. Synthesis of DNA
   b) Translation    47. In vitro DNA amplification
   c) Replicatin     48. Synthesis of proteins
   d) Apoptosi      49. Synthesis of RNA
   e) PCR           50. Programmed cell death

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Cairo University    May, 30, 2009
Faculty of Medicine  First Year
Medical Biochemistry Department  Time : 3 hr. (including 20 min. for MCQ)

Biochemistry Examination (75 marks)
(Including 10 marks for MCQ)

I. Complete:
   (5 marks)
   1. ........................ is the alcohol of glucose, while, ........................ is the alcohol of galactose.
   2. ........................ is the tumor marker used for diagnosis of cancer colon, while ........................ is used for diagnosis of liver cancer.
   3. Sickle cell anemia is caused by replacement of the amino acid ........................ at position 6 of the a-chain of hemoglobin by the amino acid ........................
   4. ........................ is acyclic eicosanoid, while, ........................ is cyclic.
   5. Structural proteins of extracellular matrix include mainly ........................

II. define:
    (6 marks)
    1. Primary structure of protein.
    2. Plasmid.
    3. southern blotting.
    4. RNA splicing.
    5. Restriction endonucleases.

III. Enumerate:
    (10 marks)
    1. Four mechanisms for conversion of proto-oncogenes into oncogenes.
    2. Four sphingosine containing compounds.
    3. Four causes of gene mutations.
    4. Four post-translational covalent alterations of proteins (processing).
    5. Four causes of cell membrane asymmetry.
IV. Diagrammatically illustrate:
1. Control of cell cycle.
2. Structure of tRNA.
3. Lactose operon (Lac operon) of E. coli.

V. Mention the differences between:
1. Eukaryotic and prokaryotic replication (four differences).
2. DNA and RNA (four differences).
3. Structure of hemoglobin and myoglobin (four differences).

VI. What are the hydrolytic products of:
1. CoASH.
2. Inosine
3. Lysolecithin
4. Glutathione
5. FAD

VIII. Give an account of:
1. Importance of telomeres and role of telomerase.
2. Types of a-thalassemias.
3. Applications of PCR.
4. Types and functions of immunoglobulins.
6. Glucose and galactose are:
   a) Aldopentoses
   b) Ketohexoses
   c) Optically inactive monosaccharides.
   d) Reducing monosaccharides.
7. All the following are abnormal Hb except:
   a) HbS
   b) HbC
   c) HbM
   d) HbF
8. The synthesis of a certain protein requires all the following except:
   a) A ribosome.
   b) mRNA
   c) Amino acids
   d) Okazaki fragments
9. The lipid bilayer structure of cell membrane is maintained by all the following except:
   a) Van der Waal's forces.
   b) Hydrogen bonding between polar groups.
   c) Ionic interactions between polar groups.
   d) Covalents bonds.
10. Immunoglobulin M (IgM) is characterized by all the following except:
    a) It is restricted only to the blood stream.
    b) It is a pentamers.
    c) It represents about 10% of the total plasma immunoglobulins.
    d) It mediates immediate hypersensitivity reaction (allergy).
11. All the following are unsaturated fatty acids except:
    a) Arachidonic acid
    b) Oleic acid
    c) Palmitic acid
    d) Palmitoleic acid
12. Xeroderma pigmentosum is a disease caused by:
    a) Defective DNA repair.
    b) Lack of telomerase activity
    c) Hyperactivity ty of DNA polymerase III.
    d) Non of the above.
13. The most potent mineralocorticoid is:
    a) Aldosterone
    b) Cortisol
    c) Cortisone
    d) anderstenedione
14. Forces stabilizing the tertiary structure of proteins include all the following except:
    a) Hydrogen bonds.
    b) Disulfide bonds.
    c) Ionic bonds.
    d) Peptide bonds
15. Aromatic amino acids include:
    a) Alanine and lysine
    b) Phenylalanine and tyrosine
    c) Tyrosine and methionine
    d) Phenylalanine and alanine
16. All the following containsulfur except:
    a) Methionine
    b) Heparin
    c) NAD+
    d) Cysteine
17. The step that leads to release of the polypeptide chain from tRNA is catalyzed by:
   a) UAA
   b) Peptidyl transfrase
   c) Releasing factors
   d) Stop codons

18. All the following are components of 43S preinitiation complex except:
   a) IF-2 and GTP.
   b) Met-tRNA
   c) IF-4
   d) 40S ribosomal subunit.

19. During DNA replication, the sequence of 5' TAGA3' will produce:
   a) 5' TCAT 3'
   b) 5'UCUA 3'
   c) 5'ATCT 3'
   d) 5'TCTA 3'

20. As regards Rho (p) factor, all the following are true except:
   a) It is protein in nature.
   b) It has ATPase activity
   c) It is important for initiation of transcription.
   d) It helps dissociation of RNA from DNA.
Illustrate your answers with diagrams whenever possible:

Answer the following questions:

1. discuss the histological structure (L.M. & E.M.) of skeletal muscle fiber

2. Draw & Label colored diagrams of:
   a. T.S. in Aorta.
   b. Lymph node.

3. a. Name & Describe the bone forming cell and the bone resorbing (destroying) cell, with reference to their functional structure & ultrastructure.
   b. Name the types of blood capillaries & compare them in terms of their structure and sites of distribution.

4. In a table form compare spleen & lymph node.

5. Define neuroglia and give full account on their types, structure, with special reference to their classification, location and functions.

6. Give short account on the following cells with reference to their functional ultra structure:
   a. Fibroblast
   b. Mast cell
   c. Neutrophil
   d. Melanocyte (melanin synthesis is not required)
HISTOLOGY
M. C. Q

Select & encircle the single best answer:

1. Lysosomes perform all the following functions except:
   a- nucleic acid hydrolysis
   b- protein degradation
   c- protein glycosylation
   d- destruction of old organelles
   e. destruction of bacteria

2. During the preparation of a routine H & E slide, how is the tissue preserved?
   a- Fixation   b- Embedding in paraffin
c- Staining    d- Slicing   e- Dehydration

3) Match
Proerythroblast - Reticulocyte - Erythrocyte - Polychromatophilic erythroblast
   - Orthochromatophilic erythroblast
   a- stage at which cells usually leave the bone marrow
   b- first cell type in series incapable of mitosis
c- also called a normoblast
d- contain a pyknotic nucleus
e- cell type in which nucleoli are most easily visualized

4. Which of the following would be best suited to demonstrate lipid?
   a- Wright's stain   b- Hematoxylin and eosin stain
c- Sudan stain     d- Silver impregnation
e- Masson's trichrome stain

5. The extra cellular matrix and cytoskeleton communicate across the cell membrane through.
   a- protoglycans   b- Integeins   c- Cadherins
d- intermediate filaments   e- microtubules

6. The triple arrangement of microtubules is found in
   a- centerioles   b- cytoplasmic microtubules
c- flagella d- axonemes e- microtubules

7. Reticular fibers in lymphoid organs are composed of which collagen?
   a- collagen type I   b. collagen type III   c- collagen type IV
d- collagen type V   e- collagen type IX

8. After birth, growth in the length of long bones occurs primarily through
   a- increased bone deposition under periosteum
   b- the action of osteoblast in primary ossification center
c- the action of osteoblast in secondary ossification center.
d- appositional growth from the periphery
e- interstitial growth of cartilage cells in the epiphyseal plate.

9. Nuclear bag and nuclear chain fibers are modified:
   a- skeletal muscle   b- cardiac muscle   c- smooth muscle
d- nerve fibers e- subunits of rER

10. The multinucleated arrangement of skeletal muscle during development is produced by
    a- duplication DNA of myoblast without cytokinesis
    b- fusion of mononucleate myoblasts
c- cell proliferation of myotubes
d- hypertrophy of myoblasts
e- satellite cell differentiation

11. Cell mediated immunity, as occurs in graft rejection result from the activity of:
    a- plasma cells   b- B-lymphocyte   c- T-lymphocytes
d- monocyte e- mast cells
12. Regeneration of axons
   a- occurs in the segment distal to the damage
   b- is independent on the survival of the perikaryon
   c- includes a decrease in the volume of the perikaryon
   d- is dependent on proliferation of schwann cells
   e- is initiated with an increase in production of Nissle bodies

13. Which of the following cells contains numerous microtubules arranged in an elongated axoneme?
   a- neutrophil   b- motor nerve axon
   c- spermatozoon   d- red blood cell   e- columnar cells

14. Which of the following body parts contains dense irregular C.T.?
   a- tendone   b- sclera of the eye   c- mesentry
   d- lamina propria   e- subcutaneous tissue

15. Each of the following statement concerning granulopoiesis is true. Except:
   a- heterochromatin of the nucleus occurs in association with specific granule accumulation.
   b- Metamyelocytes contain specific and azurophilic granules.
   c- specific granule outnumbered azurophilic granules.
   d- promyelocytes lack azurophilic granules.
   e- myeloblast lack specific granule

16. Each of the following statement concerning the basement membrane is true. Except:
   a- it contain laminin   b- it contains collagen type I
   b- it surround capillaries   d- in some cases, it perform elective filtration
   e- in some cases, hemidesmosomes attach it to the basal surface of epithelial cells.

17. Capillaries found in the central nervous system are without pinocytic vesicles and are examples of:
   a- continuous (somatic) capillaries   b- fenestrated (visceral) capillaries
   c- sinusoidal capillaries   d- non of the above

18. Epithelial reticular cells of the thymus have all the following except:
   a- are found in the cortex   b- participate in the blood thymic barrier
   c- are derived from the third pharyngeal pouch   d- rest on basal lamina

19. The lymphatic nodules of a lymph node are present at:
   a- deep cortex   b- medulla   c- paracortical zone   d- outer cortex

   a- myofilaments   b- sacromere   c- transverse lobules   d- dense bodies

Put (T) for true statements & (F) for the false & correct the false:

1. The shape of the cells in the surface layer to transitional epithelia is variable.
2. Desmosomes are an effective barrier to the diffusion of substances across an epithelium.
3. Stereocilia are actively motile structures which help to move substances along the epithelial surface.
4. The proteoglycans of ground substance consist mainly of protein.
5. Adipose tissue and reticular connective tissue are special variants of loose connective tissue.
6. Mammary glands are simple tubular glands.
7. Triads are found at the border between the I- and A- bands of cardiac muscle cells.
8. Extensive GAP junctions are found at the intercalated discs which join cardiac muscle cells.
9. Articular cartilage is a specialised form of elastic cartilage.
10. The mineral crystals in bone called Calcite.
11. The specific granules of neutrophils are likely to be primary lysosomes.
12. Modified nerve cells called Purkinje fibres mediate the excitation of cardiac muscle cells.
13. Connective tissue cells are the dominant tissue component in dense connective tissues.
14. Most of the lymphocytes in the blood stream will be B-lymphocytes.
15. Lamellae surrounding Haversian canals are called circumferential lamellae.
Illustrating your answers with diagrams answer the following questions:

1. Describe the histological structure & classification of neurons.  
   (10 marks)

2. Draw a labeled colored diagram for:
   
   a- Hyaline cartilage.
   b- Spleen.  
   (5 marks each)

3. Mention differences between:
   
   a- Red blood corpuscles & white blood cells.
   b- Different types of muscle fibers.
   c- Medium sized artery & medium sized vein.  
   (5 marks each)

4. Describe:
   
   a- Histological structure & function of rough endoplasmic reticulum.
   b- Histological structure of stratified squamous epithelium.
   c- Function ultrastructure of: i. mast cell ii. Osteoclast cell.  
   (5 marks each)
HISTOLOGY

Answer the following questions:

1. Illustrating your answer with diagrams, describe the histological structure of the skeletal muscle (L.E & E.M) with references to the nervous receptor which is found in muscular tissue. (10 marks)

2. Draw a colored labeled diagram for:
   a. Spinal ganglia. (H. & E)  (5 marks)
   b. Aorta.                   (5 marks)

3. Describe the histological structure of a thymic lobule with reference to the blood thymic barrier. (5 marks)

4. Mention light & electron microscopic picture of keratinocytes of the epidermis. (5 marks)

5. Give short account on:
   a) Sex chromatin (Barr Body) & its clinical importance. (4 marks)
   b) Adipose connective tissue.                                (4 marks)
   c) Osteoclasts (origin, site, L.E, E.M. & functions).        (4 marks)
   d) Neutrophils (% diameter, L.E., E.M. & functions).         (4 marks)
   e) Types of blood capillaries.                               (4 marks)

I- Choose & encircle the best answer:

1. Where are ependymal cells found?
   a) epineurium
   b) perineurim
   c) the outer covering of central nervous system
   d) the inner lining of central nervous system.

2. In perisynaptic vesicies it is likely to find:
   a) neurotransmitters
   b) neurotransmitter degrading enzymes
   c) neurotransmitter receptors
   d) all the above

3. The majority of the neuron of central nervous system are:
   a) motor
   b) sensory
   c) interneuron
   d) autonomic

4. Which type of encapsulated nerve ending is located in dermal papillae?
   a) Pacinian corpuscle
   b) Meissner's corpuscle.
   c) free nerve ending
   d) Merkel's corpuscle.

5. The triplet arrangement of microtubules is found in which of the following?
   a) Centrioles
   b) Cytoplasmic microtubule
   c) Flagellae.
   d) Axonemes.
6. Which of the following is specifically found in the liver, spleen, and bone marrow?
   a) Continuous capillaries
   b) Fenestrated capillaries
   c) Sinusoidal capillaries
   d) AV anastomoses

7. The "prickles" which characterize "prickle cells" represent the location of:
   a) ribosomes
   b) desmosomes.
   c) keratohyalin granules
   d) lipofuscin

8. Principle component of Nissel granules which is responsible for their basophilia is:
   a) DNA  b) RNA  c) proteoglycan  d) protein

9. The cells responsible for secretion of thymic hormones are:
   a) B lymphocytes
   b) Epithelial reticular cells
   c) T helper lymphocytes
   d) Thymocytes

10. T lymphocytes are programmed in:
    a) Thymus
    b) Lymph node
    c) Bursa of Fabricus
    d) Bone marrow

11. Which epidermal cell type is a part of the immune system
    a) keratinocytes
    b) melanocytes
    c) Langerhans cells.
    d) Merkel cells

12. The pluripotential cell that is prevalent around post capillary venules:
    a) Fibroblast
    b) Endothelial cell
    c) Pericyte
    d) Histiocyte

13. Golgi tendon organs are considered as:
    a) Chemoreceptor
    b) Mechanoreceptor
    c) Proprioceptor
    d) Photoreceptor

14. Uncapsulated nerve ending that is located in the spideria?
    a) Pacinian corpuscle.
    b) Meissner’s corpuscle.
    c) free nerve ending
    d) Merkel's corpuscle.

15. The portion of the junctional complex primarily responsible for restricting the passage of molecules between adjacent epithelial cells:
    a) Zonula occcludens
    b) Zonula adherens
    c) Macula adherens
    d) hemidesmosomes

16. Which of the glial cells is responsible for myelination of dendrites in central nervous system?
    a) astrocytes
    b) Schwann cell
    c) oligodendrocytes
    d) non of the above

17. Kleinfilter Syndrome occurs due to:
    a) Deletion
    b) Isochromosome
c) Non-disjunction
d) Duplication

18. The gland with an unbranched duct is called:
   a) Simple gland
   b) Compound gland
   c) Tubulo-alveolar gland
   d) Simple branched gland

19. A blood picture of a patient suffering from tonsillitis shows increase in the percentage of which blood cell:
   a) eosinophils
   b) basophils
   c) neutrophils
   d) monocytes

20. The process of degeneration & regeneration of peripheral nerve involves all the following except:
   a) mitosis of neuron
   b) mitosis of Schwann cells
   c) chromatolysis
   d) degeneration of axon distal to injury

21. The structures at the base of cilia that are ultrastructurally similar to centrioles and are involved in ciliary movement:
   a) Terminal web
   b) Desmosomes
   c) Basal bodies
   d) Steriocilia

22. Structure that are associated primarily with the transverse region of the intercalated discs and play an adhesive function in cardiac muscle cells:
   a) Fasciae Adherenes
   b) Gas junctions
   c) Sarcoplasmic reticulum
   d) Anchoring fibres

23. The junction between Schwann cells along an axon is termed:
   a) Schmidt-Lantermann Cleft
   b) Macla adherens
   c) Node of Ranvier
   d) Gap junction

24. The reservoir for calcium within the cytoplasm of skeletal muscle cells is:
   a) Transverse tubule
   b) Sarcomere
   c) Sarcolemma
   d) Sarcoplasmic reticulum

25. Formation of new cartilage along the surface of preexisting cartilage is termed:
   a) Apppositional growth
   b) Interstitial growth
   c) Intramembranous growth
   d) Isogenous growth

26. Antibody-producing cells within connective tissue are termed:
   a) Mast cells
   b) Fibroblasts
   c) Plasma cells
   d) Macrophages

27. Loose connective tissue would typically be found in which of the following locations:
   a) Perichondrium of cartilage
   b) Deep layer of the dermis
   c) Lamina propria of the digestive system
   d) Tendons

28. Thymus gland has an affective blood-barrier because their blood capillaries are of which of the following types?
   a) continuous type with few vesicles.
b) Fenestrated type with diaphragms.
c) Fenestrated type without diaphragms.
d) Discontinuous type with diaphragms

29. Which of the following neurons has the greatest number of axons?
   a) pseudo-unipolar
   b) bipolar
   c) multipolar
   d) none of the above

30. Which of the following molecules forms the coating of vesicles involved in endocytosis and exocytosis?
   a) Clathrin
   b) Spectrin
   c) Vimentin
   d) Actin

31. The primary function of intermediate filaments is which of the following?
   a) Generate movement
   b) Provide mechanical stability
   c) Help in separation of dividing cells
   d) Transport organelles within the cell

32. T lymphocytes tend to be most abundant in which of the following regions of the lymph node:
   a) Capsule  b) Cortex  c) Paracortex  d) Madullary cords

33. A 5-year-old boy had a tear in his gastrochemius muscle when he was involved in a bicycle accident. Regeneration of the muscle will occur through which of the following:
   a) Differentiation of satellite cells
   b) Fusion of damaged myofibers to form new myofibers
   c) Hyperplasia of existing myofibers
   d) Differentiation of fibroblasts to form myocytes

34. For each of the descriptions of endochondral bone growth below, mention the appropriate zone:
   a) Cartilage cells undergo cell division and become organized into rows.
   b) Cartilage located adjacent to the marrow cavity; chondrocytes dying.
   c) Cartilage cells become enlarged; matrix is compressed into linear “bands”.

35. Metin type of myofilaments would be found in these regions of a skeletal muscle:
   a) I Band
   b) A. Band
   c) H zone
   d) M line
1. Basophils and plasma cells are stained metachromatically with trypan blue.

2. Taste bud is an example of myo-epithelium.

3. The cell-mediated immune response is primarily through b lymphocytes.

4. The framework of the thymus is largely made up of epithelioreticular cells.

5. In large veins, the tunica media is the thickest layer consisting primarily of numerous elastic lamellae.

6. Epithelium is characterized by much intercellular substance & fibers.

7. Absorbing cells have long cilia.

8. Endothelial cells lining larger arteries are part of the tunica adventitia.

9. Pericytes are often associated with small capillaries and appear to be differentiated macrophages that engulf foreign material transversing the capillary wall.

10. The kidney is a compound tubuloalveolar gland.
Choose the correct answer from the alternatives given in brackets. Write the correct answer in the space given in the answer sheet. Do not rewrite the sentence. Make sure that you write the correct spelling of the words you choose. If you write more than one answer or misspell words your answer will be marked wrong.

Part One:

Vocabulary and Grammar

1. The opposite of balance is (imbalance / inbalance / disbalance).
2. The most common infection (report / exports / reports) from acupuncture treatment is viral hepatitis.
3. Pneumothorax is a (part / partly / partial) collapse of the lungs.
4. Dementia is a broad medical term that (refer / refers / reference) to the loss of cognitive functions.
5. Alzheimer's (infects / effects / afflicts) about 4 million Americans.
6. Memory (loss / lose / loose) is prevalent among those who suffer from Alzheimer's.
7. The earliest stages of the disease often go unnoticed because the onset of symptoms (is / are / will) gradual.
8. Your choice of words was (unappropriate / disappropriate / inappropriate).
9. John is advised to stay (with / on / in) medicine.
10. After we consume medications, they are absorbed from the intestine and (into / to / in) the blood.
11. A person (can / will / should) not take another person's medications without a doctor's specific instructions.

12. Medicines are used to (permit / prevent / persist) illnesses.

13. The adjective from apply is (appliable / applicable / application).

14. Pharmacology / Pharmacy / Pharmacopoeia is the branch of medicine that deals with the uses, effects, and modes of action of drugs.

16. Hypertensive people have to restrict their salt (uptake / offtake / intake).

17. For (heaven's / heavens' / heavens) sake, stop smoking!

18. T pant is to (walk / breathe / lift) rapidly.

19. Tension headaches (account / discount / count) for about 90% of all headaches.

20. Restricted blood flow may (contribute / contradict / conclude) to the headache you have.

21. (Cautious / Caution / Cushion) must be taken to avoid driving when this drug is used.

22. Insomnia is a (faction / factory / factor) in many car crashes.

23. Transient means (permanent / acute / momentary).

24. Da Vinci (rejected / injected / subjected) the blood vessels with wax.

25. I am not interested (at / in / to) politics.

26. The baby is not familiar (to / about / with) the sound of the toy.

27. Sleep is a natural body function during which we are relatively (preconscious / unconscious / conscious).

28. I'm sorry; I don't (recall / call / promote) your name.

29. The opposite of external is (outer / internal / eternal).

30. Trauma to the face and teeth can result (in / from / about) car accidents.

Part Two:

Plurals and Medical Affixes (Prefixes and Suffixes):

31. The plural form of monarch is (monarches / monarchs / monarchoys).

32. The plural form of roof is (roofs / roofes / roves).

33. The plural form of zero is (zeroes / zerous / zerom).

34. The plural form of curriculum is (curricula / curriculae / curricula).

Choose the word that is related to each of the suffixes and prefixes given below:

35. andro (masculine / arteries / female)

36. carcino (heart / cancerous / head)

37. derma (skin / bleeding / gland)

38. gloss- (skin / tongue / vessels)

39. myo- (water / muscle / nerves)

40. penta (five / six / two)

41. rhino (eyes / nose / bones)

42. tachy (black / below / speedy)

43. cide (side / killer / acid)

44. graph (recording / stopping / flowing)

45. malacia (hardening / softening / flowing)

46. megaly (enlargement / measuring / breathing)

47. phasia (swallowing / speaking / resembling)

48. plegia (speaking / paralysis / bleeding)

49. tomy (cutting / nourishment / softening)

50. uria (urine / mucous / sputum)
1. The singular of stigma is:  
   a) stigmatoon  
   b) stigmatoma  
   c) stigma  
   d) stigmat

2. The singular of bacteria is:  
   a) bacter  
   b) bacteri  
   c) bacteria  
   d) bacterium

3. The singular of thoraces is:  
   a) thorac  
   b) thoraci  
   c) thoracic  
   d) thoracium

4. The singular of scissors is:  
   a) scissors  
   b) scissor  
   c) scissorsa  
   d) scissorium

5. The singular of teeth is:  
   a) teeth  
   b) tee  
   c) teething  
   d) tooth

6. The plural of blood is:  
   a) bloodes  
   b) bleed  
   c) blood  
   d) bloods

7. The plural of enema is:  
   a) enemata  
   b) enamaes  
   c) enemas  
   d) enemna

8. The plural of prognosis is:  
   a) prognosis  
   b) prognoses  
   c) prognosies  
   d) prognosisi

9. The plural of kidney’s is:  
   a) kidney  
   b) kidneys  
   c) kidneyes  
   d) kidney

10. The plural of ganglion is:  
    a) ganglia  
    b) ganglioni  
    c) ganglions  
    d) ganglion

11. Heat means:  
    a) thermo  
    b) thel  
    c) thrembo  
    d) thorace

12. Heart means:  
    a) cox  
    b) cysto  
    c) cardio  
    d) cranio.

13. Sytomach means:  
    a) gloss  
    b) gastro  
    c) glacto  
    d) ginvga

14. Liver means:  
    a) hist  
    b) homo  
    c) heap  
    d) hydro

15. Radiation means:  
    a) rhino  
    b) radio  
    c) retino  
    d) retro

16. Pain means:  
    a) algia  
    b) aemia  
    c) aden  
    d) angio

17. Paralyxis means:  
    a) phrenia  
    b) plasty  
    c) plegia  
    d) pathy

18. Inflammation means:  
    a) itis  
    b) iatrics  
    c) asis  
    d) iiris

19. Tumkor means:  
    a) ostomy  
    b) oma  
    c) oid  
    d) ology

20. Stitch means:  
    a) rhhea  
    b) rhixes  
    c) rhaphy  
    d) rhoaa

21. Thi is an:  
    a) emergent  
    b) emergency  
    c) emerge  
    d) emergencies

22. The ambulance carried the:  
    a) died  
    b) dying  
    c) dyting  
    d) dyed

23. The patient asked for the doctor’s:  
    a) device  
    b) devise  
    c) advise  
    d) advise

24. Alzhiemers:  
    a) afflicts  
    b) effects  
    c) effective  
    d) effectively

25. Doctors and nurses:  
    a) insure  
    b) insurance  
    c) assure  
    d) ensure

26. The inner living teeth tissue is the:  
    a) enamel  
    b) dentin  
    c) root  
    d) pulp

27. Sleep walking is:  
    a) insomnia  
    b) soporific  
    c) somnambulism  
    d) somnolence.

28. The place for keeping dead bodies is:  
    a) cellar  
    b) mortuary  
    c) ward  
    d) ambulance

29. Chloriformis used as an:  
    a) anesthetic  
    b) antiseptic  
    c) analgesic  
    d) antibiotic

30. The purpose for ot prescribing medication is:  
    a) indication  
    b) complication  
    c) complication  
    d) metabolism.

31. A condition that worsen and ends in death is:  
    a) metastatic  
    b) malignant  
    c) symptom  
    d) ambulatory

32. Sharp, severe, and brief is:  
    a) chronic  
    b) benign  
    c) epidemic  
    d) acute

33. A disease of unknown cause is:  
    a) iatrogenic  
    b) idiopathc  
    c) congenital  
    d) degenerative

34. A cell, group of cells or organ that produces a secretion is:  
    a) glan  
    b) fiber  
    c) lobe  
    d) duct

35. A wound/injury to the body or mind is:  
    a) ulcer  
    b) tumor  
    c) trauma  
    d) scar

36. The opposite of outer is:  
    a) inner  
    b) internal  
    c) external  
    d) inside

37. The opposite of normal is:  
    a) innormal  
    b) unnormal  
    c) nonnormal  
    d) abnormal

38. The opposite of adequate is:  
    a) inadequate  
    b) inadequate  
    c) nonadequate  
    d) disadquate

39. If medication is stopped, bacteria can be:  
    a) resist  
    b) resistant  
    c) preventive  
    d) effective

40. After we consume drugs, they:  
    a) absorb  
    b) absorbed  
    c) are absorbed  
    d) absorption

41. When symptoms improve the doctor will take patient:  
    a) out of  
    b) off  
    c) away  
    d) of

42. The pain associated:  
    a) with  
    b) by  
    c) to  
    d) at

43. Chronic insomnia:  
    a) inquires  
    b) requires  
    c) rejects  
    d) refuses

44. Remaining in bed:  
    a) during  
    b) while  
    c) for  
    d) since

45. Da Vini’s technique of dissection is still used:  
    a) during  
    b) while  
    c) for  
    d) since

46. Oral surgeons:  
    a) employed  
    b) do  
    c) perform  
    d) administer

47. Ambulance carried dressings to the:  
    a) injury  
    b) injured  
    c) injuries  
    d) injure

48. Scientists found:  
    a) evident  
    b) evident  
    c) evidence  
    d) evidentily

49. By dissecting human bodies:  
    a) medicine  
    b) medication  
    c) medicament  
    d) medical

50. Sleep walking and bed wetting occur during:  
    a) short  
    b) long  
    c) quick  
    d) slow.