

**ENTRANCE EXAMINATION FOR ADMISSION, MAY 2013.**

**M.Sc. (MEDICAL PHYSIOLOGY)**

**COURSE CODE : 505**

Register Number :

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*Signature of the Invigilator  
(with date)*

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**COURSE CODE : 505**

**Time : 2 Hours**

**Max : 400 Marks**

***Instructions to Candidates :***

1. Write your Register Number within the box provided on the top of this page and fill in the page 1 of the answer sheet using pen.
2. Do not write your name anywhere in this booklet or answer sheet. Violation of this entails disqualification.
3. Read each question carefully and shade the relevant answer (A) or (B) or (C) or (D) in the relevant box of the ANSWER SHEET using HB pencil.
4. Avoid blind guessing. A wrong answer will fetch you -1 mark and the correct answer will fetch 4 marks.
5. Do not write anything in the question paper. Use the white sheets attached at the end for rough works.
6. Do not open the question paper until the start signal is given.
7. Do not attempt to answer after stop signal is given. Any such attempt will disqualify your candidature.
8. On stop signal, keep the question paper and the answer sheet on your table and wait for the invigilator to collect them.
9. Use of Calculators, Tables, etc. are prohibited.

1. A differential blood count
  - (A) Gives the number of red blood cells per cubic millimeter
  - (B) Determines the percentage of erythrocytes per cubic millimeter
  - (C) Gives the number and variety of leucocytes in each 200 counted
  - (D) Determines the platelet count
  
2. The intrinsic factor necessary for the complete maturation of red blood cells is derived from
  - (A) Bone marrow
  - (B) Vitamin-B<sub>12</sub>
  - (C) Liver
  - (D) Mucosa of the stomach
  
3. A haemoglobin measurement of 15g / 100 mL (or 1 dL) of blood is
  - (A) Within the normal limits
  - (B) Subnormal
  - (C) Above normal
  - (D) Low, but satisfactory
  
4. Which of the following is most consistent with a diagnosis of appendicitis?
  - (A) An increase in monocytes
  - (B) An increase in erythrocytes
  - (C) Leukopenia
  - (D) An increase in neutrophils
  
5. Blood vascular system in Hemichordata is
  - (A) Open
  - (B) Reduced
  - (C) Closed
  - (D) Absent
  
6. When the atrioventricular bundle is completely interrupted the
  - (A) Atria beat at an irregular rate
  - (B) Ventricles typically contract at 30 to 40 beats/min
  - (C) PR intervals in the ECG are longer than normal but remain constant from beat to beat
  - (D) QRS complex varies in shape from beat to beat
  
7. Which of the following is not a condition of late diastole?
  - (A) The atria and ventricles are relaxed
  - (B) The AV valves are open
  - (C) The aortic semilunar valve is open
  - (D) Both (A) and (C)
  
8. Which of the following blood vessels in the circulatory system of frog has more oxygenated blood?
  - (A) Pulmocutaneous artery
  - (B) Pulmocutaneous vein
  - (C) Pulmonary artery
  - (D) Precaval veins

9. During ventricular contraction
- (A) All the blood is forced out of the ventricles
  - (B) Some of the blood remains in the ventricles
  - (C) No blood is forced out of the ventricles
  - (D) Some blood backflows into the atria
10. Which of the following is not the part of pulmonary circuit?
- (A) The left atrium
  - (B) The pulmonary trunk
  - (C) The aortic semilunar valve
  - (D) The pulmonary vein
11. The blood vessels that are under the greatest
- (A) Large arteries
  - (B) Small arteries
  - (C) Veins
  - (D) Capillaries
12. How many hearts are found in earthworm?
- (A) 8 (four pairs)
  - (B) 2 (one pair)
  - (C) 6 (three pairs)
  - (D) 12 (six pairs)
13. The correct sequence for blood entering the heart through the venae cavae and leaving through the aorta is
- (A) Right atrium, left atrium, left ventricle, right ventricle
  - (B) Left ventricle, left atrium, right ventricle, right atrium
  - (C) Right atrium, right ventricle, left atrium, left ventricle
  - (D) Left atrium, left ventricle, right atrium, right ventricle
14. The sinoatrial node (SA node) is situated in the wall of the
- (A) Right atrium
  - (B) Interventricular septum
  - (C) Pulmonary trunk
  - (D) Superior vena cava
15. To clearly hear the sound of the bicuspid valve, a stethoscope should be placed to the
- (A) Right of the sternum at the second intercostals space
  - (B) Left of the sternum at the second intercostals space
  - (C) Left of the sternum at the fifth intercostals space inferior to the nipple
  - (D) Right of the sternum at the fifth intercostals space
16. Angiotensinogen is a protein produced and secreted by
- (A) Macula densa cells
  - (B) Endothelial cells (cells lining the blood vessels)
  - (C) Liver cells
  - (D) Juxtaglomerular (JG) cells

17. Return of blood to the heart is not facilitated by
- (A) Venous valves
  - (B) The skeletal muscle pump
  - (C) Skeletal muscle groups
  - (D) Venous pressure
18. Resistive vessels of the circulatory system are
- (A) Large arteries
  - (B) Large veins
  - (C) Small arteries and arterioles
  - (D) Small veins and venules
19. Discontinuous or fenestrated capillaries are found in
- (A) Muscles
  - (B) Adipose tissue
  - (C) CNS
  - (D) Small intestine
20. Compared to veins, arteries contain a thicker
- (A) Endothelium
  - (B) Tunica intima
  - (C) Tunica media
  - (D) Tunica adventitia
21. Granules are not visible in
- (A) Neutrophils
  - (B) Lymphocytes
  - (C) Eosinophils
  - (D) Basophils
22. Leucopaenia is the condition, in which
- (A) The total number of leucocytes decrease below 5000/cu mm
  - (B) The total number of leucocytes increases above 6000/cu mm
  - (C) Bone marrow is destroyed
  - (D) Formation of leucocytes stops
23. In an adult, the majority of leucocytes are
- (A) Basophils
  - (B) Eosinophils
  - (C) Lymphocytes
  - (D) Neutrophils
24. The chief function of the serum albumin in the blood is to
- (A) Produce antibodies
  - (B) Form fibrinogen
  - (C) Maintain colloidal osmotic pressure
  - (D) Remove waste products

25. As compared to arteries, veins
- (A) Contain more muscles
  - (B) Appear more rounded
  - (C) Stretch more
  - (D) Are under a greater pressure
26. The instrument by which BP of man is determined, is
- (A) BP meter
  - (B) Ultrasound
  - (C) Sphygmomanometer
  - (D) Stethoscope
27. Which of the following is not correct?
- (A) Mammalian bone is characterized by the presence of Haversian system
  - (B) Haversian canals are interconnected by Volkmann's canals
  - (C) The blood is slightly alkaline (pH7.4)
  - (D) RBCs of man are oval, biconvex and nucleated
28. Erythropoietin is a hormone secreted by kidney cells. It stimulates the
- (A) RBCs production in bone marrow
  - (B) Blood clotting
  - (C) Native immunity
  - (D) Acquired immunity
29. Vitamin-K (phylloquinone) is required for the synthesis of prothrombin necessary for
- (A) Blood clotting
  - (B) Anticoagulation
  - (C) Muscle contraction
  - (D) Muscle relaxation
30. Which one of the following has an open circulatory system?
- (A) Pheretima
  - (B) Priplaneta
  - (C) Hirudinaria
  - (D) Octopus
31. In adult man, normal BP is
- (A) 100/80 mm Hg
  - (B) 120/80 mm Hg
  - (C) 100/120 mm Hg
  - (D) 80/120 mm Hg
32. RBCs are nucleated in
- (A) Rat
  - (B) Frog
  - (C) Cat
  - (D) Rabbit

33. Heats of earthworm occur in segments  
 (A) 6, 7 and 9, 10 (B) 7,9 and 12, 13  
 (C) 9, 10 and 14, 15 (D) None of these
34. An artificial pace-maker is implanted subcutaneously and connected to the heart in patients  
 (A) Having 90% blockage of the three main coronary arteries  
 (B) Having a high blood pressure  
 (C) With irregularity in the heart rhythm  
 (D) Suffering from arteriosclerosis
35. Blood vessels are poorly developed in cockroach and open into  
 (A) Gut (B) Haemocoel  
 (C) Heart (D) Liver
36. The valve, located on the same side of the heart as the pulmonary semilunar valve is the  
 (A) Tricuspid valve (B) Mitral valve  
 (C) Bicuspid valve (D) Aortic semilunar valve
37. Which of the following has the thickest walls?  
 (A) Right ventricle (B) Left ventricle  
 (C) Right auricle (D) Left auricle
38. The pace-maker of heart is  
 (A) AV node (B) SA node  
 (C) Tricuspid valve (D) SV node
39. What is correct regarding leucocytes?  
 (A) These can squeeze out through (can cross) the capillary walls  
 (B) These are enucleate  
 (C) Sudden fall in their number indicates cancer  
 (D) These are produced in thymus
40. The impulse of heartbeat originates from  
 (A) SA node (B) Vagus nerve  
 (C) Cardiac nerve (D) AV node

41. Pheretima exhibits a closed type of blood vascular system consisting of
- (A) Blood vessels (B) Capillaries  
(C) Heart (D) All of these
42. Blood vascular system in cockroach is
- (A) Closed type (B) Open type  
(C) Both (A) and (B) (D) None of these
43. A drop of each of the following is placed separately on four slides. Which of them will not coagulate?
- (A) Blood plasma  
(B) Blood serum  
(C) Sample from the thoracic duct of lymphatic system  
(D) Whole blood from pulmonary vein
44. Which of the following is not correct?
- (A) Neutrophils are most abundant RBCs  
(B) Rh- person, if exposed to Rh<sup>+</sup>, blood will form specific antibodies against the Rh antigens  
(C) Fishes have 3½ chambered heart  
(D) Calcium ions play a very important role in clotting
45. Which of the following four components of the blood are necessary for clotting?
- (A) Calcium, vitamin-K, albumin, globulin  
(B) Calcium, prothrombin, fibrinogen, platelets  
(C) Calcium, heparin, prothrombin, fibrinogen  
(D) Calcium, prothrombin, platelets, vitamin-A
46. Which combination of muscles contraction causes inspiration?
- (A) Internal intercostals - Diaphragm  
(B) Diaphragm - Abdominal complex  
(C) External intercostals - Diaphragm  
(D) External - Internal intercostals
47. Peripheral chemoreceptors are located in
- (A) Lung tissue  
(B) The pons and medulla oblongata  
(C) Aortic and carotid bodies  
(D) The myocardium

48. Which one of the following statement is incorrect?
- (A) The residual air in lungs slightly decreases the efficiency of respiration in mammals
  - (B) The presence of non-respiratory air sacs increases the efficiency of respiration in birds
  - (C) In insects, circulating body fluids serve to distribute oxygen to tissues
  - (D) The principle of countercurrent flow facilitates efficient respiration in gills of fishes
49. If oxygen is present, how many molecules of ATP are produced by catabolism of one molecule of glucose?
- (A) 1
  - (B) 2
  - (C) 8
  - (D) 36 or 38
50. In human beings, rib case and sternum move upwardly and outwardly during
- (A) Exercise
  - (B) Sudden back injury
  - (C) Expiration
  - (D) Inspiration
51. The maximum amount of air that can be expired after a maximum inspiration is called
- (A) The forced expiratory volume
  - (B) The maximum expiratory flow
  - (C) The tidal volume
  - (D) The vital capacity
52. As  $\text{CO}_2$  produced in the tissues combines with  $\text{H}_2\text{O}$  in the blood
- (A) Carbonic acid is formed
  - (B)  $\text{Cl}^-$  enters the blood
  - (C) Most of the  $\text{HCO}_3^-$  from the carbonic acid leave the RBCs for the blood plasma
  - (D) All of the preceding occur
53. If the thoracic wall but not lungs, is punctured
- (A) The lungs get inflated
  - (B) The man dies as the lungs get collapsed
  - (C) The breathing rate decreases
  - (D) The breathing rate increases



54. In mammals, the body cavity is partitioned into thoracic and abdominal parts by
- (A) Liver (B) Lungs  
(C) Ribs (D) Diaphragm
55. Expiration involves
- (A) Relaxation of diaphragm and intercostals muscles  
(B) Contraction of diaphragm and intercostals muscles  
(C) Contraction of diaphragm muscles  
(D) Contraction of intercostals muscles
56. During inspiration, air passes into lungs due to
- (A) Increase in volume of thoracic cavity and fall in lung pressure  
(B) Fall in pressure inside the lungs  
(C) Increased volume of thoracic cavity  
(D) Muscular expansion of lungs
57. In mammals, ventilation movements of lungs are governed by
- (A) Muscular wall of lungs  
(B) Intercostal muscles  
(C) Diaphragm  
(D) Diaphragm and intercostals muscles
58. Which of the following is a false statement?
- (A) Slacker vocal cords produce higher sounds  
(B) During swallowing, the epiglottis is depressed to cover the glottis  
(C) In whispering, the vocal cords do not vibrate  
(D) Testosterone secretion influences laryngeal development during puberty
59. Surfactant
- (A) Reduces the surface tension in pulmonary alveoli  
(B) Increases the  $P_{CO_2}$  levels in blood  
(C) Is a mucous secreted by goblet cells  
(D) Reduces friction in the pleural cavity
60. Cells, which help in the transportation of  $O_2$  are
- (A) WBCs (B) Leucocytes  
(C) RBCs (D) Thrombocytes.

61. The cartilages, upon which the vocal cords are attached are
- (A) The thyroid and arytenoids cartilages
  - (B) The thyroid and cricoids cartilages
  - (C) The cuneiform and cricoids cartilages
  - (D) The thyroid and corniculate cartilages
62. Pulmonary vessels, nerves and a bronchus enter or leave the lung at
- (A) The cardiac notch
  - (B) The apex
  - (C) The capsule
  - (D) The hilum
63. Respiration involved one of the following sets of process
- (A) Inspiration, exchange of gases, expiration
  - (B) Aspiration, inspiration, expiration
  - (C) External, internal and expiration
  - (D) None of the above
64. Oxygenated blood from lungs is carried to the heart by
- (A) Pulmonary artery
  - (B) Pulmonary vein
  - (C) Coronary vein
  - (D) Pre-cavals
65. People living at sea level have around 5 million RBCs per cubic millimeter of their blood, whereas those living at an altitude of 5400 metres have around 8 million. This is because at high altitude
- (A) People get pollution-free air to breathe and more oxygen is available
  - (B) Atmospheric O<sub>2</sub> level is less and hence more RBCs are needed to absorb the required amount of O<sub>2</sub> to survive
  - (C) There is more UV radiation, which enhances RBCs production
  - (D) People eat more nutritive food, therefore more RBCs are formed
66. Pneumatic and inhibitory centers are associated with
- (A) Respiration
  - (B) Breathing
  - (C) Inspiration
  - (D) Expiration
67. When the oxygen supply to the tissues is inadequate, the condition is
- (A) Hypoxia
  - (B) Asphyxia
  - (C) Pleurisy
  - (D) Anoxia

68. What fraction of the energy releases during catabolism of glucose is capture by ATP?  
(A) 25% (B) 40%  
(C) 75% (D) 100%
69. The synthesis of glucose from proteins or lipids is referred to as  
(A) Glycogenesis (B) Glucose oxidation  
(C) Glucosynthesis (D) Gluconeogenesis
70. Expiratory muscles contract at the time of  
(A) Deep inspiration  
(B) Normal inspiration and expiration  
(C) Forceful expiration  
(D) Normal expiration
71. Residual volume in the lungs of an average human is  
(A) 500 mL (B) 3-4.5 L  
(C) 1000 mL (D) 1500 mL
72. Neither the trachea nor the bronchi contain  
(A) Hyaline cartilage  
(B) Ciliated columnar epithelium  
(C) Goblet cells  
(D) Simple squamous epithelium
73. Pharyngeal tonsils are located in  
(A) The nasopharynx (B) The oral cavity  
(C) The nasal cavity (D) The oropharynx
74. The amount of air that is moved in and out of the lungs during quiet normal breathing is called  
(A) The vital capacity (B) The tidal volume  
(C) The residual volume (D) The vital volume
75. Which of the following is not a structural feature of the left lung?  
(A) Superior lobe (B) Cardiac notch  
(C) Inferior lobe (D) Middle lobe

76. In human beings, CO<sub>2</sub> concentration in the inspired and expired air is respectively  
 (A) 0.03% and 5.3% (B) 0.4% and 5.0%  
 (C) 0.04% and 3.0% (D) 0.03% and 4.0%
77. Oxygen and carbon dioxide concentration in the alveolar air are respectively  
 (A) 16% and 4% (B) 19.8% and 4.6%  
 (C) 21% and 4% (D) 13.1% and 5.3%
78. Oxygen dissociation curve of myoglobin is  
 (A) Hypobolic (B) Hyperbolic  
 (C) Linear (D) Sigmoid
79. Inflammation of the lung covering causing severe chest pain is  
 (A) Emphysema (B) Pleurisy  
 (C) Asphyxia (D) Hypoxia
80. Tidal volume in human beings is  
 (A) 1000 mL (B) 1500 mL  
 (C) 500 mL (D) 4.5 L
81. The basic inspiratory and expiratory centers are located in  
 (A) The lungs (B) The medulla oblongata  
 (C) The carotid and aortic bodies (D) The pons
82. Arrange the following in the order of increasing volume  
 (1) Tidal volume  
 (2) Residual volume  
 (3) Expiratory reserve volume  
 (4) Vital capacity  
 (A) 1<2<3<4 (B) 1<3<2<4  
 (C) 1<4<3<2 (D) 1<4<2<3
83. When blood CO<sub>2</sub> level rise  
 (A) Only the rate of breathing decreases  
 (B) Respiratory acidosis may occur  
 (C) Peripheral pressure receptors respond  
 (D) Both the rate and depth of breathing decrease

84. Aerobic respiration increases the body's supply of  
 (A) CO<sub>2</sub> (B) Water  
 (C) ATP (D) All of the preceding
85. The primary role of oxygen in the body is to  
 (A) Help to build amino acids  
 (B) Allow glycolysis within the mitochondria of the cell  
 (C) Accept electrons in the electron transport chain  
 (D) Facilitate lipolysis within adipose cells
86. A person met with an accident and died instantly without any injury to heart, brain, stomach and kidney. One of the following is a reason for the death  
 (A) Intestine got twisted (B) RBCs became coagulated  
 (C) Stomach stopped digestion (D) Diaphragm got punctured
87. Adam's apple corresponds to  
 (A) Epiglottis (B) Trachea  
 (C) Larynx (D) Thyroid
88. The serous membrane in contact with the lung is  
 (A) The parietal pleura (B) The pulmonary mesentery  
 (C) The pulmonary peritoneum (D) The visceral pleura
89. Which is not a structure of the respiratory system?  
 (A) The pharynx (B) The bronchus  
 (C) The larynx (D) The hyoid
90. The roof of the nasal cavity is formed primarily by  
 (A) The hard palate  
 (B) The cribriform palate of the ethmoid bone  
 (C) The superior concha  
 (D) The vomer
91. The synthesis of glycogen molecules for cellular storage is referred to as  
 (A) Glycogenolysis (B) Beta oxidation  
 (C) Glyconeogenesis (D) Glycogenesis
92. Between meals, the blood glucose level is maintained by  
 (A) Insulin (B) Glycogenolysis  
 (C) Lipogenesis (D) Glycogenesis

93. Within the cell, Krebs cycle reactions occur in the  
(A) Neurotransmitter chemicals (B) Ribosomes  
(C) Nucleolus (D) Mitochondria
94. In the absence of oxygen, how many molecules of ATP are produced by catabolism of one molecule of glucose?  
(A) 1 (B) 2  
(C) 8 (D) 36 or 38
95. One of the following is a difference between pulmonary respiration of frog and human  
(A) Diaphragm and ribs play role in respiration  
(B) Lungs are respiratory organs  
(C) Respiration occurs due to pressure gradient  
(D) None of the above
96. Vital capacity of lungs of an average human is  
(A) 3000-4500 mL (B) 1500-1800 mL  
(C) 2000-2500 mL (D) 500-1000 mL
97. Volume of air left after maximum forceful expiration in human lung is  
(A) Total lung capacity (B) Residual volume  
(C) Vital capacity (D) Tidal volume
98. Partial pressure of oxygen in the inspired and expired air is respectively  
(A) 158 and 116 mm Hg (B) 158 and 40 mm Hg  
(C) 100 and 95 mm Hg (D) 40 and 95 mm Hg
99. In human beings, partial pressure of carbondioxide in the inspired and expired air is respectively  
(A) 0.3 and 40 mm Hg (B) 0.3 and 32 mm Hg  
(C) 40 and 46 mm Hg (D) 40 and 0.3 mm Hg
100. Which of the following chemical reactions can occur anaerobically?  
(A) Glycolysis  
(B) Krebs cycle  
(C) Conversion of lactic acid to pyruvic acid  
(D) Conversion of pyruvic acid to acetyl Co-A