MBBS 1ST PROFESSIONAL
MODULAR INTEGRATED 2K23
(Short Essay Questions)

Max. Marks: **35**
Time Allowed: **70 MINUTES**

	ANATOMY	
	Topic: Gross Anatomy & Special Histology Subtopic: Spleen Cognitive Level: C3 Difficulty Level: Moderate Reference: Medical Histology text & Atlas by Laiq Hussain- 8th Edition. Chapter 15: Immune system and lymphoid organs- Page no: 145-146	
1.	**Q1: A 24-year-old male is brought to emergency in an unconscious state after a road traffic accident. On examination, the doctor noticed multiple bruises on his abdomen. On ultrasonography, it was confirmed that the hematopoietic organ lying in left hypochondrium just beneath the 9th,10th and 11th rib was injured. Using your anatomical knowledge, name the organ involved and briefly explain its blood supply and also differentiate between red and white pulp.** **KEY:** Spleen is injured. (0.25) The splenic artery enters the spleen through the hilum and divides into branches as trabecular arteries. They branch & form central arterioles. Each central artery is surrounded by a periarterial lymphatic sheath. Central arteries become reduced in size, lose the investment of white pulp, enter the red pulp, and divide into straight arterioles, called penicillar arterioles. The penicillar arterioles divide and give rise to arterial capillaries, which convey the blood to the splenic sinusoids. (0.75) Two types of circulation are in spleen. (i) open circulation - According to the open circulation model, the terminal arterial capillaries release their blood into the splenic cords from where the blood slowly percolates into the sinusoids (ii) closed circulation- According to the closed circulation model, the terminal arterial capillaries are connected to the splenic sinusoids and deliver the blood directly into these sinusoids. (1) **THE RED PULP:** The red pulp appears reddish in color in the fresh state as well as in routine histological sections because it contains huge numbers of erythrocytes. The microscopic examination of the red pulp reveals that it consists of cellular cords called splenic cords, which are separated from each other by sinusoidal capillaries which are called splenic sinusoids. The splenic cords contain cells of many different kinds including erythrocytes, T lymphocytes, B lymphocytes, plasma cells, granular leukocytes, platelets, macrophages, and dendritic cells. All these cells are supported by a fine meshwork of reticular fibers and reticular cells. The splenic sinusoids (also called splenic sinuses) are wide sinusoidal capillaries which lie between the splenic cords. (1.5) **THE WHITE PULP:** This part of splenic pulp consists of typical lymphoid tissue that surrounds and follows branches of the splenic artery. This lymphoid tissue forms a cylindrical periarterial lymphatic sheath (PALS) around each branch of the splenic artery. The periarterial lymphatic sheath is composed chiefly of T lymphocytes. At places, enclosed within the PALS are lymphoid nodules, called splenic nodules, which appear as ovoid masses. These nodules are composed chiefly of B lymphocytes and most of them are secondary lymphatic nodules exhibiting germinal centers. (1.5)	2+3

	Topic: General Embryology Subtopic: Placenta Cognitive Level: C3 Difficulty Level: Moderate Reference: Book: Langman's Medical Embryology, 14th Edition, Chapter 6: 3rd month to Birth: The Fetus and Placenta, Page no: 119, 113, 114, 116	
2.	**Q2: A 34-year-old pregnant woman G2 P1(gravida2, Para1), presents at 32 weeks of gestation presents in Antenatal OPD with complaints of increasing abdominal discomfort and difficulty in breathing. On examination, her fundal height is larger than expected for the gestational age and ultrasound reveals an amniotic fluid index (AFI) of 28cm. What is the most probable diagnosis and give its causes? Describe the blood circulation of placenta?** **KEY**: Polyhydramnios. (1) Causes of Polyhydramnios: (i) Fetal causes; GIT: Esophageal/duodenal atresia, tracheoesophageal fistula, CNS: Anencephaly (decreased swallowing, exposed meninges, no antidiuretic hormone, (ii) Twin-twin transfusion (iii) Hydrops fetalis (iv) Maternal causes; Diabetes Mellitus, (iv) Idiopathic (2) Circulation of the Placenta: Cotyledons receive their blood through 80 to 100 spiral arteries that pierce the decidual plate and enter the intervillous spaces at more or less regular intervals. Pressure in these arteries forces the blood deep into the intervillous spaces and bathes the numerous small villi of the villous tree in oxygenated blood. Blood from the intervillous lakes drains back into the maternal circulation through the endometrial veins. Collectively, the intervillous spaces of a mature placenta contain approximately 150 mL of blood, which is replenished about three or four times per minute. (2)	1+2+2
	Topic: General Anatomy & General Histology **Subtopic**: Muscles & Connective Tissue **Cognitive level**: C1 **Difficulty level**: Easy **Reference:** Book: General Anatomy by Laiq Hussain Siddique, Edition: 3rd Edition, Chapter 5: Muscles, Page 74, Book: Medical Histology by Laiq Hussain Siddique, Edition: 8th Edition, Chapter 6, Connective Tissue Proper, Page 57	
3.	**Q3: A footballer had an accident during a match, he got muscle injury, recalling your knowledge of anatomy classify muscles on basis of their fibers parallel to line of pull with example of each subgroup also explain the type of connective tissue associated with muscles.** **KEY:** These muscles have great range of movement but comparatively less power. They are further classified into three subgroups: (a) strap like muscles, (b) quadrilateral muscles, and (c) fusiform muscles. (a) Strap-Like Muscles. The length of these muscles is much greater than their width, giving them a strap-like appearance. In most of such muscles the muscle fibers run for the entire length of the muscle e.g., the sartorius muscle of thigh and infrahyoid muscles of neck (sternohyoid and sternothyroid, etc.). However, the muscle fibers may run over shorter segments because there are transverse tendinous intersections at intervals e.g., the rectus abdominis muscle of the anterior abdominal wall. (1) (b) Quadrilateral Muscles. In these parallel-fibred muscles the length is short, giving the muscle a flat, quadrilateral appearance e.g., the thyrohyoid muscle of the larynx. (1) (e) Fusiform Muscles. In a fusiform muscle the fibers are arranged nearly parallel to each other in the belly region but converge toward the proximal and distal attachments, so that the muscle tapers at boll ends and, hence, appears fusiform e g. the biceps brachii. (1) Dense regular connective tissue is a type of connective tissue that is associated with muscles. This tissue is composed of densely packed bundles of collagen fibers. The limited space between the fiber bundles is occupied by the ground substance and fibroblasts. The dense regular connective tissue occurs in the form of	3+2

	cordlike or band-like structures (tendons and ligaments) or broad sheet-like structures (aponeuroses). (1) Tendons and Ligaments: Tendons are cord-like structures which attach muscles to the bones whereas ligaments are band like structures that join bones to bones. They are composed almost entirely of collagen fibers. (0.5) Aponeuroses: These structures are actually broad, flattened tendons that attach sheet-like muscles to the bones. In an aponeurosis, the collagen fibers are usually arranged in multiple layers. (0.5)	

	PHYSIOLOGY	
	Topic: Blood Subtopic: Anaemia Difficulty level: Moderate Cognitive level: C2 Reference: Guyton, 14th edition page 446	
1.	**Q.1. A 30-year-old woman presented in medical OPD with the complaints of heavy menstrual bleeding. On examination, she has pallor and spoon shaped nails. Her investigations show a mean corpuscular volume of 70 fl and a haemoglobin level of 9 mg/dl. Identify the condition that she is suffering from? Explain the pathophysiology of the given condition?** Key: Microcytic hypochromic anaemia (1) The patient has heavy menstrual bleeding leading to blood loss. (1) After haemorrhage, the body replaces the fluid portion of the plasma in 1 to 3 days, but results in a low concentration of RBCs. If a second haemorrhage does not occur, RBC concentration usually returns to normal within 3 to 6 weeks. (1) When chronic blood loss occurs, a person frequently cannot absorb enough iron from the intestines to form haemoglobin as rapidly as it is lost. (1) RBCs that are much smaller than normal and have too little haemoglobin inside them are then produced, giving rise to microcytic, hypochromic anaemia. (1)	1+4
	Topic: Autonomic Nervous System (ANS) Subtopic: Parasympathetic Nervous System Difficulty level: Difficult Cognitive level: C3 Reference: Guyton and Hall, 14th Edition, Unit XI, Table-6-11 Autonomic Effects on various organs of the body	
2.	**Q.2. A 36-year-old male patient comes to the emergency with the history of severe neck trauma. He complains of a variety of symptoms including hoarseness, tachycardia/irregular heartbeat, problems with digestion, and constipation. What division of the nervous system in this patient has been damaged? What are the major effects produced on different organs by the division of the nervous system that was damaged in this patient?** Key: Parasympathetic division of the autonomic nervous system. 1+4 Parasympathetic nervous system can have the following effects: **<u>Effects</u>** Eyes: constriction of pupils. Oral Cavity: Salivation. Heart: can Slow or even Block Cardiac Rhythm and Conduction "Ventricular Escape." Lungs: The parasympathetic nerves provide	1+4

	the dominant autonomic control of airway smooth muscle. They release acetylcholine onto muscarinic receptors, causing contraction and bronchoconstriction. GIT: exerts both excitatory and inhibitory control over gastric and intestinal tone and motility (i.e., milling, absorption, secretion, and defecation) (Rest and digest) Gall Bladder: Contraction of the muscle wall in the gallbladder is stimulated by the vagus nerve of the parasympathetic system. releases bile. Urinary Bladder: Parasympathetic postganglionic nerve terminals release acetylcholine (ACh), which can excite various muscarinic receptors in bladder smooth muscles, leading to bladder contractions.	

	BIOCHEMISTRY	
	Topic: RNA & Transcription (FB-007 & FB-013) Subtopic: RNA, its types, and post transcriptional modifications Cognition level: C1 Difficulty index: Moderate Reference: Illustrated Reviews Biochemistry 8th Edition pg 433-434, 441	
1.	**Q1 Define RNA? Give the function of the three main types of RNA. Describe the post transcriptional modification of eukaryotic mRNA.** **KEY:** **Definition:** **(0.5 mark)** The genetic master plan of an organism is contained in the sequence of deoxyribonucleotides in its DNA. However, it is through ribonucleic acid, the "working copies" of DNA, that the master plan is expressed. The copying process, during which a DNA strand serves as a template for the synthesis of RNA, is called transcription. Transcription produces messenger RNA, which are translated into sequences of amino acids, and ribosomal RNA (rRNA), transfer RNA (tRNA), and additional RNA molecules that perform specialized structural, catalytic, and regulatory functions and are not translated. **Function of 3 types** **(0.5 + 0.5 + 0.5 mark)** Ribosomal RNA rRNA are found in association with several proteins as components of the ribosomes, the complex structures that serve as the sites for protein synthesis. Prokaryotic cells contain three distinct size species of rRNA (238, 168, and SS, where S is the Svedberg unit for sedimentation rate that is determined by the size and shape of the particle). Eukaryotic cells contain four rRNA species (28S, 18S, 5.8S, and SS). Together, rRNA make up 80% of the total RNA in the cell. Transfer RNA tRNA are the smallest (4S) of the three major types of RNA molecules. There is at least one specific type of tRNA molecule for each of the 20 amino acids commonly found in proteins. Each tRNA serves as an adaptor molecule that carries its specific amino acid, covalently attached to its 3'-end, to the site of protein synthesis. There, it recognizes the genetic code sequence on an mRNA, which specifies the addition of that amino acid to the growing peptide chain. Messenger RNA mRNA comprises only 5% of the RNA in a cell but is by far the most heterogeneous type of RNA in size and base sequence. mRNA is coding RNA that carries genetic information from DNA for use in protein synthesis. In eukaryotes, this involves transport of mRNA out of the nucleus and into the cytosol. An mRNA carrying information from more than one gene is polycistronic (cistron=gene). Polycistronic mRNA is characteristic of prokaryotes. An mRNA carrying information from only one gene is monocistronic and is characteristic of eukaryotes. **Post translational modification:**	(0.5 + 1.5 + 3)

	(1+1+1 mark) The pre-mRNA components of hnRNA undergo extensive co- and posttranscriptional modification in the nucleus and become mature mRNA. These modifications usually include the following. **a) Addition of a 5'-cap:** This is the first of the processing reactions for pre-mRNA. The cap is a 7-methylguanosine attached to the 5'-terminal end of the mRNA through an unusual 5'-5'-triphosphate linkage. Creation of the cap requires removal of the γ phosphoryl group from the 5'-triphosphate of the pre-mRNA, followed by addition of guanosine monophosphate by the guanylyltransterase. Methylation of this terminal guanine occurs in the cytosol and is catalyzed by guanine-7-meth-yltransferase. S-Adenosyl methionine is the source of the methyl group. **b) Addition of a 3'-poly·A tail:** Most eukaryotic mRNA have a chain of 40-250 adenylates attached to the 3'-end. This poly-A tail is not transcribed from the DNA but rather is added by polyadenylate polymerase, using ATP as the substrate. The pre-mRNA is cleaved downstream of a consensus sequence, called the polyadenylation signal sequence (AAUAAA), found near the 3' -end of the RNA, and the poly-A tail is added to the new 3'-end. Tailing terminates eukaryotic transcription. **c)Splicing**: Maturation of eukaryotic mRNA usually involves removal from the primary transcript of RNA sequences that do not code for protein. The exons are joined together to form the mature mRNA. The process of removing introns and joining exons is called splicing. Mechanism of splicing: The binding of snRNP brings the sequences of neighbouring exons into the correct alignment for splicing, allowing two transesterification reactions to occur. The 2'-0H group of an adenine nucleotide (known as the branch site A) in the intron attacks the phosphate at the 5'-end of the intron, forming an unusual 2' 5'-phosphodiester bond and creating a "lariat" structure. The newly freed 3'-0H of exon 1 attacks the 5'-phosphate at the splice-acceptor site, forming a phosphodiester bond that joins exons 1 and 2. The excised intron is released as a lariat, which is typically degraded but may be a precursor for ncRNA such as snoRNA. Alternative splicing: The pre-mRNA molecules from >90% of human genes can be spliced in alternative ways in different tissues to produce multiple variations of the mRNA and its protein product. It is a mechanism for producing a large, diverse setof proteins from a limited set of genes. For example, the mRNA for tropomyosin undergoes extensive tissue-specific alternative splicing with production of multiple isoforms of the TM protein.	

	Topic: Hyperbilirubinemias / RBCs/ Blood Groups (HL-B 005) Subtopic: Hyperbilirubinemias Cognition level: C3 Difficulty index: Moderate Reference: Illustrated Reviews Biochemistry 8th Edition pg 284, 175	
2.	**Q-2 A 45-year-old male was presented to the emergency department. He had severe pain in right upper quadrant of the abdomen along with fever and vomiting. His laboratory investigations revealed raised bilirubin level. His ultrasonography showed multiple stones in gall bladder and one stone impacted in common bile duct. What is the type of bilirubin raised in this patient? Justify your answer. How will the impact of common bile duct effect the digestion of fat in the intestine?** **KEY** **Type of hyperbilirubinemia** **(1 mark)** Conjugated bilirubin **Justification:** **(2 marks)** The presence of a tumor or bile stones may block the duct, preventing passage of conjugated bilirubin into the intestine. Patients with obstructive jaundice experience GI pain and nausea and produce stools that are a pale, clay color. The conjugated bilirubin regurgitates into the blood causing conjugated hyperbilirubinemia. **Effect on fat digestion:** **(2 marks)** Detergent properties of bile salts are needed for the emulsification of duodenal lipids and stabilization of lipid	1+2+2

	droplets as they become smaller from peristalsis andprevent them from coalescing. This increases the surface area for the digestive enzymes to act upon. Since bile is absent the emulsification of fat is not possible, and digestion of fats is impaired leading to loss of fats in the feces.	

	Topic: Hemoglobin & Myoglobin Subtopic: HEMOGLOBINOPATHIES, HEME AND ANEMIAS Difficulty Level: MODERATE Cognitive level: C2	
3.	**Sickle cell anemia is characterized by lifelong episodes of pain ("crises") and chronic hemolytic anemia with associated hyperbilirubinemia. What is the pattern of inheritance of sickle cell disease? Give the biochemical cause of crises, hemolytic anemia and hyperbilirubinemia in these patients.** **Key:** Sickle cell disease is an autosomal recessive disorder. It occurs in individuals who have inherited two mutant genes (one from each parent) that code for synthesis of the β chains of the globin molecules If both parents have Sickle Cell Trait (SCT), there is a 50% (or 1 in 2) chance that any child of theirs also will have SCT, if the child inherits the sickle cell gene from one of the parents. Such children will not have symptoms of SCD, but they can pass SCT on to their children. The replacement of the charged glutamate with the nonpolar valine forms a protrusion on the β chain that fits into a complementary site on the β chain of another hemoglobin molecule in the cell. At low oxygen tension, deoxyhemoglobin S polymerizes inside the RBC, forming a network of insoluble fibrous polymers that stiffen and distort the cell, producing rigid, misshapen RBC. Such sickled cells frequently block the flow of blood in the narrow capillaries. This interruption in the supply of O2 leads to localized anoxia (oxygen deprivation) in the tissue, causing pain and eventually ischemic death (infarction) of cells in the vicinity of the blockage. Anoxia also leads to an increase in deoxygenated HbS. Compared to normal RBC, sickled cells have a decreased ability to deform so there is increased hemolysis. Normal life span of RBCs is 120 days but in sickle cell disease it is less than 20 days, hence causing hemolytic anemia. The liver has the capacity to conjugate and excrete >3,000 mg of bilirubin/day, whereas the normal production of bilirubin is only 300 mg/day. This excess capacity allows the liver to respond to increased heme degradation with a corresponding increase in conjugation and secretion of CB. However, extensive hemolysis in patients with sickle cell anemia may produce bilirubin faster than it can be conjugated. UCB levels in the blood become elevated causing unconjugated hyperbilirubinemia.	02,03

MBBS 1ST PROFESSIONAL
MODULAR INTEGRATED 2K23
Block-I
(Multiple Choice Questions)

Total Marks: **85**
Time Allowed: **110 MINUTES**

ANATOMY

Topic: General Histology
Subtopic: Cell organelles
Cognitive Level: C2
Difficulty Level: Moderate
Reference: Book: Medical Histology text & Atlas by Laiq Hussain - 8th Edition Chapter 2: The cell,pg 14

1. **A 1st year student is given a hematoxylin and eosin-stained slide. According to your knowledge which cellular structure will impart the hematoxylin stain to slide:**
   a. Mitochondria
   b. Ribosomes
   c. Rough endoplasmic reticulum
   d. Nucleus
   e. Nucleoplasm

Topic: General Histology
Subtopic: Cytoskeleton
Cognitive Level: C2
Difficulty Level: Moderate
Reference: Book: Medical Histology text &Atlas by Laiq Hussain - 8th Edition Chapter 2: The cell, page: 21

2. **A histopathologist is examining the slide of skin under light microscope. Which of the following intermediate filament is visible in this slide:**
   a. Actin filaments
   b. Desmin filaments
   c. Keratin filaments
   d. Vimentin Filaments
   e. Lamin filaments

Topic: General Histology
Subtopic: Epithelium
Cognitive Level: C3
Difficulty Level: Hard
Reference: Book: Medical Histology text &Atlas by Laiq Hussain - 8th Edition Chapter 3: Epithelium, page: 42

3. **A 35-year-old infertile female presented to medical OPD with chronic respiratory tract infections. Which of the following apical domain is defected in this condition of patient?**
   a. Cilia
   b. Flagella
   c. Microvilli
   d. Primary cilium
   e. Stereocilia

Topic: General Histology
Subtopic: Epithelium
Cognitive Level: C1
Difficulty Level: Easy
Reference: Book: Medical Histology text &Atlas by Laiq Hussain - 8th Edition Chapter 3: Epithelium, page: 37

4. **A medical student is examining a slide of urinary bladder. Which of the following is the characteristic feature of transitional epithelium?**
   a. Microvilli are seen.
   b. Pseudostratified epithelium
   c. Presence of goblet cells
   d. Single layered epithelium
   e. Umbrella cells are present.

Topic: General Histology
Subtopic: Connective tissue

Cognitive Level: C2
Difficulty Level: Moderate
Reference: Book: Medical Histology text &Atlas by Laiq Hussain - 8th Edition
Chapter 5: Connective Tissue, page: 51

5. **A female of 35 years went to her family doctor during month of March with complaints of running nose, repetitive bouts of sneezing and itchy eyes. He made a diagnosis of allergic rhinitis. Which of the following cells are responsible for her condition?**

   a) Basophils
   b) Eosinophils
   c) Mast cells
   d) Plasma cells
   e) Pericytes

Topic: General Histology
Subtopic: Connective tissue
Cognitive Level: C2
Difficulty Level: Moderate
Reference: Book: Medical Histology text &Atlas by Laiq Hussain - 8th Edition
Chapter 5: Connective Tissue, page: 54

6. **A 57-year-old male came in surgical OPD after 2 weeks of open appendectomy with complain of inflammation on scar. Which of the following types of fibers are accumulated in this inflammatory scar?**

   a. Collagen fibers
   b. Elastic fibers
   c. Elaunin fibers
   d. Oxytalan fibers
   e. Reticular fibers

Topic: General Histology
Subtopic: Glandular Epithelium
Cognitive Level: C1
Difficulty Level: Easy
Reference: Book: Medical Histology text &Atlas by Laiq Hussain - 8th Edition
Chapter4: Glands, page: 47

7. **A 25-year-old hyperthyroid girl complains about excessive sweating even in normal condition. What is the type of sweat gland?**

   a. Coiled Simple tubular gland
   b. Compound tubular gland
   c. Holocrine gland
   d. Simple acinar gland
   e. Straight simple tubular gland

Topic: General Histology
Subtopic: Cell junctions
Cognitive Level: C2
Difficulty Level: Moderate
Reference: Book: Medical Histology text & Atlas by Laiq Hussain - 8th Edition
Chapter 1: The Cell, page: 25

8. **During electron microscopic examination of an epithelium, a student identified a disc shaped electron dense attachment plaque on the plasma membrane of two opposing cells, this disc shaped plaque could be a part of**

   a. Fascia adherens
   b. Gap junction
   c. Macula adherens
   d. Zonula adherens
   e. Zonula occludens

Topic: Special Histology

Subtopic: Lymph node
Cognitive Level: C1
Difficulty Level: easy
Reference: Book: Medical Histology text &Atlas by Laiq Hussain - 8th Edition
Chapter 14: The Immune System and lymphoid organ, page: 143

9. Section from a lymph node of 35-year-old male reveals a structure lined with cuboidal cells with their ovoid nuclei. This structure is:

a. Medullary artery
b. Medullary vein
c. Capsular venules
d. High endothelial venules
e. Precapillary sphincter

Topic: Special Histology
Subtopic: Tonsil
Cognitive Level: C1
Difficulty Level: Easy
Reference: Book: Medical Histology text &Atlas by Laiq Hussain - 8th Edition
Chapter 14: The Immune System and lymphoid organ, page: 148

10. ENT surgeon sends a biopsy specimen of palatine tonsil. Which of the following is the characteristic feature that helps a histopathologist to identify the slide of palatine tonsil from other lymphoid organs?

a. Crypts lined with stratified squamous epithelium
b. Lymphoid nodules with germinal centers
c. Lymphoid nodules without germinal centers
d. Presence of diffuse lymphoid tissue
e. Connective tissue capsule having smooth muscles

Topic: General Embryology
Subtopic: Gametogenesis; Chromosomal abnormalities
Cognitive Level: C1
Difficulty Level: Easy
Reference: Book: Langman's Medical Embryology, Edition: 14th Edition, Chapter 2: Gametogenesis, page 21

11. On amniocentesis, it was detected that the fetus has chromosomal abnormality XXY which is also known as

a. DiGeorge Syndrome
b. Down's Syndrome
c. Edward's Syndrome
d. Klinefelter Syndrome
e. Patau Syndrome

Topic: General Embryology
Subtopic: Gametogenesis
Cognitive Level: C2
Difficulty Level: Moderate
Reference: Book: Langman's Medical Embryology, Edition: 14th Edition, Chapter 2: Gametogenesis, Page no: 14

12. Teratomas are tumors that often contain different tissues like bone, hair, muscle, gut epithelia and others because these tumors originate from

a. Hypoblast cells
b. Multipotent stem cells
c. Pluripotent stem cells
d. Totipotent stem cells
e. Trophoblast cells

Topic: General Embryology
Subtopic: First Week of Development: Ovulation to implantation
Cognitive Level: C3

Difficulty Level: Hard
Reference: Book: Langman's Medical Embryology, Edition: 14th Edition, Chapter 3, First Week of Development: Ovulation to implantation, Page 44

13. In a developing embryo craniofacial and cardiovascular abnormalities can develop due to defects in Anterior Visceral Endoderm which establishes:

a. Cranial-caudal polarity
b. Bilateral symmetry
c. Dorsal-ventral polarity
d. Left-right polarity.
e. Proximal-distal axis

Topic: General Embryology
Subtopic: Embryonic Period
Cognitive Level: C2
Difficulty Level: Moderate
Reference: Book: Langman's Medical Embryology, Edition: 14th Edition, Chapter 6: Third to Eighth Week of Development: The Embryonic Period, Page 76

14. A 4-year-old child presented with constipation and abdominal pain. On examination doctors found a mass in abdomen. On detailed investigation he was diagnosed with neuroblastoma. Which of the following cells are involved in this condition?

a. Dermis
b. Ectoderm
c. Neural Crest Cells
d. Neuroblasts
e. Notochord

Topic: General Embryology
Subtopic: First Week of Development
Cognitive Level: C1
Difficulty Level: Moderate
Reference: Book: Langman's Medical Embryology, Edition: 14th Edition, Chapter 3: First Week of Development: Ovulation to implantation, Page 37

15. One of the earliest tests that can be used to confirm pregnancy even at 2nd week of gestation is hCG levels in maternal blood. hCG is produced by:

a. Cytotrophoblast
b. Decidual Cells
c. Embryoblasts
d. Hypoblasts
e. Syncytiotrophoblast

Topic: General Embryology
Subtopic: Third Week of Development
Cognitive Level: C3
Difficulty Level: Hard
Reference: Book: Langman's Medical Embryology, Edition: 14th Edition, Chapter 5: Third Week of Development: Trilaminar Germ Disc, Page 66

16. An ultrasound scan detects a large mass near the sacrum of a 28-week female fetus. What might the origin of such a mass?

a. Allantois
b. Notochord
c. Primitive streak
d. Primary villi
e. Urachus

Topic: General Anatomy
Subtopic: Terms of movements
Cognitive level: C1
Difficulty level: Easy
Reference: General anatomy by Laiq Hussain Siddique, page no 18 ,3rd edition

17. **A 4-year-old child fell from a bicycle. Presented to emergency with complain of severe pain in right foot while standing & walking. Upon examination he was unable to perform twisting motion of the right foot that turns sole inwards. This movement is:**
    a. Eversion
    b. Inversion
    c. Dorsiflexion
    d. Protraction
    e. Planter flexion

    Topic: General anatomy
    Subtopic: Classification of bone according to size and shape
    Cognitive level: C1
    Difficulty level: Easy
    Reference: General anatomy by Laiq Hussain, 3rd edition, page 26

18. **On X- ray of a patient with fracture of hand, findings indicate fracture of miniature long bones which are:**
    a. Tarsals
    b. Scaphoid
    c. Pisiform
    d. Lunate
    e. Metacarpals

    Topic: General anatomy
    Subtopic: Integumentary system
    Cognitive level:C1
    Difficulty level: Easy
    Reference: Book: General anatomy by Laiq Hussain, 3rd edition, Page no. 107

19. **In a general anatomy class, medical students are taught about major functions of skin. One of the following functions is performed by the blood vessels of the skin which is:**
    a. Protective Barrier
    b. Temperature regulation
    c. Vitamin D production
    d. Metabolism
    e. Fatty acid synthesis

    Topic: General Anatomy
    Subtopic: Nervous System
    Cognitive level: C1
    Difficulty level: Easy
    Reference: Book; General anatomy by Laiq Hussain, 3rd edition, Page no.117

20. **A patient of multiple sclerosis came to outpatient for routine checkup, in this disease myelin sheath of nerve cells is damaged. Which of the following cells contribute to formation of myelin sheath in peripheral nervous system.**
    a. Oligodendrocytes
    b. Microglial cells
    c. Astrocytes
    d. Schwann cells
    e. Ependymal cells

PHYSIOLOGY

    Topic: Homeostasis
    Subtopic: Control systems of the body
    Cognition level: C1
    Difficulty level: Easy
    Reference: Guyton & Hall,14th Edition, page no 9, Chapter 1.

21. **During childbirth, stretching of the cervix sends signals through the uterine muscle back to the body of the uterus. This is an example of:**

    a. Adaptive control

b. Automaticity
c. Negative feedback control
d. Positive feedback control
e. Gain of a control system

Topic: Cell
Subtopic: Cell organelles
Cognition level: C2
Difficulty level: Moderate
Reference: page 18, Chapter 2, Guyton 14th ed.

22. A 45-year-old chronic alcoholic presents to the emergency department with symptoms of altered mental state and hallucinations. The alcohol in his blood will be detoxified by the hydrogen peroxide of peroxisomes in association with:

a. Caspase
b. Catalase
c. Glycosidase
d. Lipase
e. Protease

Topic: Cell
Subtopic: Remodelling
Difficulty level: Easy
Cognition level: C1
Reference: Page 22, Chapter 2 Guyton 14th ed.

23. Which of the following is a process by which obsolete organelles are degraded and recycled in a cell?

a. Apoptosis
b. Atrophy
c. Autophagy
d. Necrosis
e. Pyroptosis

Topic: Cell
Subtopic: Cell division
Cognition level: C2
Difficulty level: Moderate
Reference: Page 44, Chapter 3 Guyton 14th ed

24. A medical student is observing cell division under a specialized microscope. He can visualize the chromatids being pulled apart at the centromere and moving toward the poles. These cells are exhibiting:

a. Anaphase
b. Cytokinesis
c. Karyokinesis
d. Metaphase
e. Prophase

Topic: ANS
Subtopic: Receptors of ANS
Difficulty Level: Moderate
Cognition level: C2
Reference: Guyton & Hall,14th Edition; Page no 768, Chapter 61.

25. An experimental animal was given a drug that stimulates the alpha-adrenergic receptors. This will lead to:

a. Bladder sphincter relaxation
b. Constriction of iris
c. Intestinal muscle contraction
d. Intestinal sphincter relaxation

e. Vasoconstriction

Topic: ANS
Subtopic: Sympathetic nervous system
Difficulty Level: Moderate
Cognition level: C2
Reference: Guyton & Hall,14th Edition; Page no 769, Chapter 61.

26. A boy visited a circus and got scared upon seeing a lion. As a consequence of his fear, he will have a reduced:

a. Blood flow in gut.
b. Blood glucose concentration.
c. Heart rate.
d. Mental activity.
e. Sweating

Topic: ANS
Subtopic: Sympathetic nervous system
Difficulty Level: Moderate
Cognition level: C2
Reference: Guyton & Hall,14th Edition; Page no 764, Chapter 61.

27. A factory worker encountered an accident that led to an extensive damage to his lumbar spinal cord segments. The autonomic fibres lost in this injury will be:

a. Preganglionic parasympathetic fibers
b. Postganglionic parasympathetic fibers
c. Preganglionic sympathetic fibers
d. Postganglionic sympathetic fibers
e. Adrenergic sympathetic fibers

Topic: Blood
Subtopic: Platelets and Haemostasis
Difficulty level: Easy
Cognitive level: C1
Reference: Guyton and Hall, 14th Edition. Chapter: 37. Page No. 477-478

28. Which of the following is the correct sequence of events leading to blood clotting?

a. Coagulation, platelet aggregation, vasoconstriction
b. Platelet aggregation, coagulation, vasoconstriction
c. Platelet aggregation, vasoconstriction, coagulation
d. Vasoconstriction, coagulation, platelet aggregation
e. Vasoconstriction, platelet aggregation, coagulation

Topic: Blood
Subtopic: Bleeding disorders
Difficulty level: Moderate
Cognitive level: C2
Reference: Guyton and Hall, 14th Edition. Chapter: 37. Page No. 485

29. To prevent excessive bleeding during surgery, a patient with haemophilia A may be given:

a. Fresh frozen plasma
b. Factor VIII concentrate
c. Factor IX concentrate
d. Factor X concentrate
e. Whole blood

Topic: Blood
Subtopic: Tissue transplant, graft-rejection
Difficulty level: Hard
Cognitive level: C2
Reference: Guyton and Hall, 14th Edition. Chapter: 36. Page No. 475-476

30. For hematopoietic stem cell transplants, MHC class I matching is needed to avoid the development of:

a. Antibody-medicated rejection
b. Cytotoxic T-cell rejection
c. Hyperacute rejection
d. Hypersensitivity reaction
e. Immune complex formation

Topic: Blood
Subtopic: Tissue transplant and graft rejection
Difficulty level: Moderate
Cognitive level: C2
Reference: Guyton and Hall, 14th Edition. Chapter: 36. Page No. 475

31. If a patient presents with severe combined immunodeficiency (SCID), the major complication with providing a bone marrow transplant to this patient would be:

a. Delayed onset anaphylaxis
b. Cardiovascular failure
c. Graft versus host disease
d. Respiratory failure
e. Acute renal failure

Topic: Blood
Subtopic: Platelet Disorders
Difficulty level: Hard
Cognitive level: C3
Reference: Guyton and Hall, 14th Edition. Chapter: 37. Page No. 485-486

32. A young patient is hospitalized with petechiae of oral mucous membrane, gingival haemorrhage having a platelet count of 45000/µl. The bleeding time (BT) and clot retraction time are increased, RBC and TLC are normal. He is suffering from:

a. Disseminated intravascular coagulation.
b. Immune thrombocytopenia
c. Non-thrombocytopenic purpura
d. Warfarin induced skin necrosis.
e. Thrombocytopenic Purpura

Topic: Blood
Subtopic: Blood Groups
Difficulty level: Moderate
Cognitive level: C2
Reference: Guyton and Hall, 14th Edition. Chapter: 36. Page No. 473-474

33. A mother having blood type B-ive who has always been perfectly healthy just delivered her first baby. The father is of blood group B+ive. Knowing that the first child is of blood group B+ive (B Rh+), what would you expect when she delivers the second baby?

a. The baby may have an ABO blood group incompatibility
b. The baby may develop both Rh and ABO incompatibility
c. The baby may develop hemolytic disease of the newborn
d. There will be no chance of developing haemolytic disease
e. The baby will have respiratory distress syndrome

Topic: Blood
Subtopic: Blood Proteins
Difficulty level: Easy
Cognitive level: C1
Reference: Guyton & Hall, Edition 14; Page no: 479, Chapter 37

34. Which plasma protein is responsible for blood coagulation?

a. Albumin
b. Antithrombin III
c. Erythropoietin
d. Fibrinogen
e. Globulin

Topic: Blood
Subtopic: RBCs
Difficulty level: Easy
Cognitive level: C1
Reference: Guyton & Hall, Edition 14; Page no: 447, Chapter 33

35. A native living at an altitude of 15000 feet above sea level has a red blood cell count of 6-7 million/cubic mm of blood. His condition is called:

a. Congenital polycythemia
b. Primary erythrocytosis
c. Primary polycythemia
d. Secondary polycythemia
e. Polycythemia vera

Topic: Blood
Subtopic: RBCs
Difficulty level: Hard
Cognitive level: C2
Reference: Guyton & Hall, Edition 14; Page no: 446, Chapter 33

36. A 17-year-old female presents to her family physician complaining of palpitations, generalized weakness, fatigue, cold extremities, and shortness of breath. Laboratory investigations reveal haemoglobin concentration of 8g/dl, MCV=75fl, MCH=26pg, MCHC=28g/dl. She is suffering from:

a. Hypochromic microcytic anemia
b. Hypochromic normocytic anemia
c. Normochromic macrocytic anemia
d. Normochromic microcytic anemia
e. Normochromic normocytic anemia

Topic: Blood
Subtopic: Inflammation
Difficulty level: Moderate
Cognitive level: C2
Reference: Guyton & Hall, Edition 14; Page no: 450-451, Chapter 34

37. Q17: A 10-year-old boy was brought to his family physician with complains of high grade fever, pain in throat, cough and severe body aches since last night. Doctor diagnosed him as a case of acute pharyngitis. Which of the following type of white blood cells are increased in this case?

a. Basophils
b. Eosinophils
c. lymphocytes
d. Macrophages
e. Neutrophils

Topic: Blood
Subtopic: WBCs
Difficulty level: Moderate
Cognitive level: 2
Reference: Guyton & Hall, Edition 14; Page no: 458, Chapter 34

38. A 13-year-old presents to the emergency room, with a 2-week history of diarrhoea and dehydration. His stool specimen is positive for parasitic eggs. Which type of WBCs would have an elevated number in blood?

a. Basophils
b. Eosinophils
c. Macrophages
d. Monocytes
e. Neutrophils

Topic: Blood
Subtopic: WBCs
Difficulty level: Hard
Cognitive level: C3
Reference: Guyton & Hall, Edition 14; Page no: 458, Chapter 34

39. A 5years old boy presented in OPD with 3 months history of bleeding gums, frequent infections, bone pain, pallor, and weight loss. On examination his cervical lymph nodes were swollen. CBC with complete peripheral film shows decrease in RBCs, platelets, increase in WBCs and presence of lymphoblasts. What is the most likely diagnosis?

a. Acute lymphocytic leukemia
b. Acute myelogenous leukemia
c. Aplastic anemia
d. Chronic lymphocytic leukemia
e. Chronic myelogenous leukemia

Topic: Blood
Subtopic: Immunity
Difficulty level: Hard
Cognitive level: C3
Reference: Guyton & Hall, Edition 14; Page no: 467, Chapter 35

40. A 35 years old male visits his family physician, complaining of fever, muscle pain, weakness, night sweats and history of weight loss for six months. Careful questioning reveals that he has past history of intravenous drug abuse. Laboratory tests reveal presence of anti-HIV antibodies in serum. Which of the following cells are affected in his case?

a. B-lymphocytes
b. Cytotoxic T cells
c. Helper T cells
d. Monocytes
e. Suppressor T cells

Topic: Blood
Subtopic: Allergy
Difficulty level: Moderate
Cognitive level: C3
Reference: Guyton & Hall, Edition 14; Page no: 469-470, Chapter 35

41. A 9-year-old female has nasal discharge and itching of eyes in the spring every year. An allergist performs a skin test using a mixture of grass pollens. Within a few minutes she develops a focal redness and a swelling at test site. The response is most likely due to:

a. Activation of B-lymphocytes
b. Activation of CD4 helper cells
c. Activation of cytotoxic T lymphocytes
d. Activation of neutrophils due to injected antigens
e. Antigen-antibody complexes of blood vessels

Topic: Blood
Subtopic: Allergy
Difficulty level: Moderate
Cognitive level: C2
Reference: Guyton & Hall, Edition 14; Page no: 469-470, Chapter 35

42. A 12-year-old schoolboy is brought to the emergency department of hospital with red blotches on skin. His mother reveals that he develops such rashes frequently in the spring. Which of the following antibodies is responsible for his condition?

a. IgA
b. IgD
c. IgE
d. IgG
e. IgM

Topic: Signal transduction
Subtopic: G-protein signaling
Difficulty level: Moderate
Cognitive level: C1
Reference: Harpers Illustrated Biochemistry By Peter J. Kennelly 32 edition pg 511

43. G-protein coupled receptors (GPCR) are bound to G-proteins on the cytoplasmic aspect of cell membrane. What binds with G protein after interaction with GPCR leading to dissociation of α subunit from βγ subunit?

a. ADP
b. ATP
c. cAMP
d. GDP
e. GTP

Topic: Subcellular organelles
Subtopic: Inherited disorders/ I-cell disease
Difficulty level: Hard
Cognitive level: C3
Reference: Lippincott's illustrated reviews Biochemistry 8th Edition Pg 169

44. A 4-year-old boy presents in the OPD. He has coarse facial features, skeletal abnormalities, and mental retardation. Hematological results show large amounts of lysosomal enzymes in blood and urine. Large inclusion bodies are also seen in the cells of these patients. The doctor tells his parents that the child is suffering from a genetic storage disorder due to which acid hydrolases are absent in his sub cellular organelle. What is the most likely diagnosis?

a. Hunter Syndrome
b. I-cell disease
c. Refsum disease
d. Parkinsonism
e. Progeria

Topic: Chemistry of purine and pyrimidines
Subtopic: Linkage of purine and pyrimidine in nucleic acid synthesis
Difficulty level: Easy
Cognitive level: C1
Reference: Lippincott's illustrated reviews Biochemistry 8th Edition Pg 413

45. DNA is made of two linked strands that wind around each other to resemble a twisted ladder. In a double stranded DNA molecule, the following base pair is seen.

a. Adenine and Cytosine
b. Adenine and thymine
c. Adenine and Uracil
d. Adenine and Guanine
e. Guanine and Uracil

Topic: DNA
Subtopic: Chargaff's rule
Difficulty level: Easy
Cognitive level: C2
Reference: Lippincott's illustrated reviews Biochemistry 8th Edition Pg 413

46. If a section of DNA has 13% thymine, then how much adenine is there?

a. 13%
b. 26%
c. 37%
d. 74%
e. 87%

Topic: RNA
Subtopic: RNA
Difficulty level: Easy
Cognitive level: C2
Reference: Lippincott's illustrated reviews Biochemistry 8th Edition Pg 435

47. The sequence of the template DNA strand is 5'-GATATCCATTAGTGAC-3'. What is the sequence of the RNA produced?

a. 5'-CAGUGAUUACCUAUAG-3'
b. 5'-CTATAGGTAATCUUCTG-3'
c. 5'-CUAUAGGUAAUCACUG-3'
d. 5'-GTCACTAATGGATTATC-3'
e. 5'-GUCACUAAUGGAUAUC-3'

Topic: Nucleotides
Subtopic: Role of synthetic analogues in medicine
Difficulty level: Hard
Cognitive level: C2
Reference: Lippincott's Illustrated reviews Biochemistry 8th Edition Pg 304

48. A 62-year-old man has been experiencing abdominal pain, constipation, and rectal bleed for the last 7 months. He visits his GP and is diagnosed with colorectal carcinoma. The GP prescribed him 5-flurouracil along with other chemotherapeutic agents to help shrink the tumor and prevent it from spreading. 5-flurouracil interferes with the incorporation of the following base into DNA:

a. Adenine
b. Cytosine
c. Guanine
d. Thymine
e. Uracil

Topic: Chromosomes
Subtopic: Higher organization of DNA
Difficulty level: Easy
Cognitive level: C2
Reference: Harpers Illustrated Biochemistry By Peter J. Kennelly 32 edition pg 363

49. When the cell is entering into division phase, the chromatin material of the eukaryotic cell becomes highly condensed, is gene-poor, and transcriptionally silent. Which of the following proteins is closely associated with the structure of condensed chromatin and provides support to it leading to its compaction?

a. Cohesins
b. Condensin
c. Histones
d. SMC proteins
e. Topoisomerases

Topic: Nucleotide Metabolism
Subtopic: Interpretation of Lesch-Nyhan Syndrome on a given data
Difficulty level: Hard
Cognitive level: C2
Reference: Lippincott's Illustrated reviews Biochemistry 8th Edition Pg 296

50. A patient presents in OPD with painful joints and history of kidney stones. There is also a history of biting of lips and fingers. His serum uric acid levels are high. The doctor explains to his attendant that he is suffering from a rare X-linked disease that causes complete deficiency of hypoxanthine-guanine phosphoribosyltransferase (HGPRT) leading to hyperuricemia. What is the most likely diagnosis?

a. Adrenoleukodystrophy
b. Fabry Disease
c. Kabuki syndrome
d. Lesch Nyhan Syndrome

e. Rickets

Topic: Replication
Subtopic: Prokaryotic DNA replication
Difficulty level: Moderate
Cognitive level: C2
Reference: Lippincott's Illustrated reviews Biochemistry 8h Edition Pg 435

51. In a cell, DNA replication starts from a single unique sequence and continues along two replication forks moving away from the origin in opposite directions. What type of cell will this kind of DNA replication be taking place in?

a. Algae
b. Bacteria
c. Fungus
d. Hepatocyte
e. Myocyte

Topic: Replication
Subtopic: DNA replication
Difficulty level: Moderate
Cognitive level: C3
Reference: Harpers Illustrated Biochemistry By Peter J. Kennelly 32 edition pg 373

52. A DNA molecule in which both strands have radioactive thymidine is permitted to replicate in an environment that contains non-radioactive thymidine. What is the right number of DNA molecules which possess some radioactive thymidine post three duplications?

a. four such molecules
b. eight such molecules
c. one such molecule
d. ten such molecules
e. two such molecules

Topic: DNA repair
Subtopic: Xeroderma pigmentosum
Difficulty level: Moderate
Cognitive level: C2
Reference: Harpers Illustrated Biochemistry By Peter J. Kennelly 32 edition pg 412

53. DNA analysis of a 17-year-old boy showed accumulation of thymine dimers. He had a history of sensitivity to sunlight and was diagnosed with skin cancer. What defect in repair of DNA is seen in such patients?

a. Base excision repair
b. Double strand break repair
c. Mismatch repair
d. Nucleotide excision repair
e. Transcription coupled repair

Topic: Transcription
Subtopic: Prokaryotic transcription
Difficulty level: Moderate
Cognitive level: C1
Reference: Lippincott's illustrated reviews Biochemistry 8th Edition Pg 436

54. The consensus sequence on the DNA that is recognized by the sigma subunit of the prokaryotic RNA polymerase is:

a. 5'-TAATAT-3'
b. 5'-TATAAA-3'
c. 5'-TATAAT-3'
d. 5'-TTGAAC-3'
e. 5'-TTGACA-3'

Topic: Translation
Subtopic: Post-translational modification
Difficulty level: Easy
Cognitive level: C1
Reference: Lippincott's illustrated reviews Biochemistry 8th Edition Pg 461

55. mRNA is translated and proteins are synthesized in the cell cytoplasm. After synthesis some proteins undergo addition of monosaccharides to their structures. In which part of the cell does this process take place?

a. Centrioles
b. Golgi apparatus
c. Lysosomes
d. Mitochondria
e. Ribosomes

Topic: Translation
Subtopic: Inhibition of translation by drugs
Difficulty level: Moderate
Cognitive level: C2
Reference: Lippincott's illustrated reviews Biochemistry 8th Edition Pg 457

56. Mrs. ABC is a 55-year-old woman, experiencing symptoms of a respiratory infection for several days, including coughing, wheezing and shortness of breath. After physical examination and laboratory tests, she is diagnosed with community acquired pneumonia. The doctor prescribes her erythromycin. How does erythromycin act to inhibit the spread of bacteria?

a. Bears a structural resemblance to aminoacyl-tRNA and accepts peptide from the P site.
b. inds irreversably to a site on the 50s subunit and inhibits translocation.
c. Binds to the 30s subunit and distorts its structure.
d. Interacts with the 30s subunit, blocking access of the aminoacyl-tRNA 1o the A site.
e. Inhibits prokaryotic peptidyltransferase.

Topic: Hemoglobin and its types/RBCs
Subtopic: Hemoglobin
Difficulty level: Moderate
Cognitive level: C1
Reference: Lippincott's illustrated reviews Biochemistry 7th Edition Pg 227

57. In biosynthesis of heme condensation between succinyl co A and glycine requires as a coenzyme;

a. Biotin
b. Flavin adenine dinucleotide
c. Flavin mononucleotide
d. Nicotinamide adenine dinucleotide
e. Pyridoxal phosphate

Topic: Hemoglobin and its types/RBCs
Subtopic: Hemoglobin
Difficulty level: Moderate
Cognitive level: C2
Reference: Lippincott's illustrated reviews Biochemistry 8th Edition Pg 25

58. The ability of hemoglobin to serve as effective transporter of oxygen and carbon dioxide between lungs and tissues is explained by which of the following.

a. The isolated heme group with ferrous iron binds oxygen more avidly than carbon dioxide
b. The alpha and beta chains of hemoglobin have very different structure from that of myoglobin
c. Hemoglobin utilizes oxidized ferric iron to bind oxygen in contrast to ferrous iron of myoglobin
d. Hemoglobin shows more changes in secondary and tertiary structure after binding to oxygen
e. Hemoglobin binds proportionately more oxygen at low oxygen tension than does myoglobin

Topic: Hemoglobinopathies/RBCs/Homeostasis
Subtopic: RBCs
Difficulty level: Hard
Cognitive level: C3
Reference: Lippincott's illustrated reviews Biochemistry 8th Edition Pg 378

59. A 2-year-old boy of normal weight and height is brought to a clinic because of excessive fatigue. Blood work indicates anemia, with microcytic hypochromic red cells. The boy lives in a 100-year-old apartment building and has been caught ingesting paint chips. His parents indicate that the child eats a healthy diet and takes a vitamin supplement every day. His anemia is most likely attributable to a deficiency in which of the following?

a. Iron
b. B12
c. Folate
d. Heme
e. B6

Topic: Iron metabolism/RBCs
Subtopic: Iron metabolism
Difficulty level: Moderate
Cognitive level: C2
Reference: Lippincott's illustrated reviews Biochemistry 8th Edition Pg 378

60. A 26-years-old female discussed family planning with her doctor. She is interested in starting a family soon and is looking for advice that what nutritional supply would be beneficial in pregnancy. The doctor suggests which of the following supplements as being most important for health of the fetus.

a. Iron & vitamin K
b. Iron and riboflavin
c. Vitamin A & folic acid
d. Iron and folic acid
e. Vitamin C & vitamin D

Topic: Iron metabolism/RBCs
Subtopic: Iron metabolism
Difficulty level: Moderate
Cognitive level: C2
Reference: Lippincott's illustrated reviews Biochemistry 8th Edition Pg 404

61. Hemochromatosis is a genetic disorder of iron overload which is secondary to the decrease in the expression of hepcidin because of a mutation in gene leading to inability to release excess iron into the circulation. Normally when iron is in excess, hepcidin;

a. Increase the formation of ferritin
b. Inactivates ferroprotein.
c. Prevents the reduction of Fe3 to Fe2
d. Transport the iron across the cell membrane
e. Catalyzes the oxidation of Fe2 to Fe3

Topic: Heme degradation/RBCs
Subtopic: Heme degradation/RBCs
Difficulty level: Easy
Cognitive level: C1
Reference: Harpers Illustrated Biochemistry By Peter J. Kennelly 32 edition pg 330

62. The catabolism of hemoglobin

a. Occurs in erythrocytes
b. Occurs in myocytes
c. Occurs in hepatocytes
d. Occurs in neutrophils
e. Occurs in renal cells

Topic: Hyperbilirubinemias/RBCs/Blood group
Subtopic: Hyperbilirubinemias
Difficulty level: Hard
Cognitive level: C3
Reference: Lippincott's illustrated reviews Biochemistry 8th Edition Pg 285

63. A newborn, premature child has developed severe discoloration of skin, decreased muscle tone and twitching movements of the limbs. His laboratory investigation shows total bilirubin of 32 mg/dl. Phototherapy and exchange blood transfusion were advised. This condition occurred because of:

a. Crossing of blood brain barrier by hydrophobic unconjugated bilirubin
b. Crossing of blood brain barrier by hydrophilic conjugated bilirubin
c. Failure of liver to uptake bilirubin
d. Failure of enzymatic conversion of biliverdin to bilirubin

Topic: Genetics
Subtopic: Sickle cell anemia
Difficulty level: Hard
Cognitive level: C2
Reference: Lippincott's illustrated reviews Biochemistry 8th Edition Pg 36

64. The substitution of valine for glutamate at position 6 of two beta chains of sickle cell hemoglobin causes which of the following:

a. Decrease polymerization of deoxyhemoglobin
b. Increased electrophoretic mobility at Ph 7
c. Increased solubility of deoxyhemoglobin
d. More flexible red blood cells
e. Unchanged primary structure

COMMUNITY MEDICINE & PUBLIC HEALTH

Topic: Changing Concept of health and diseases
Subtopic: Theories of disease causation
Difficulty level: Moderate
Cognitive level: C2
Reference: PSM K Park 24th ed Page 8-9

65. In 4th Century BCE the scholars believe that the health was determined by the humoral factors. The disequilibrium of the humoral factor leads to disease. This concept of disease causation falls under which of the following theory?

a. Personnel theory
b. Naturalistic theory
c. Biomedical concept
d. Multifactorial theory
e. Spiritual theory

Topic: Health & Disease
Subtopic: Determinants of Disease
Difficulty level: Moderate
Cognitive level: C2
Reference: PSM K Park 24th ed Page 24-26

66. Which one of the following health indicators depicts all dimensions of health?

a. Life expectancy at birth
b. Mortality rates
c. Morbidity rates
d. Human Development Index
e. Premature deaths

Topic: Prevention and control of diseases
Subtopic: Levels of Prevention
Difficulty level: Moderate
Cognitive level: C1
Reference: Reference: PSM K Park 24th ed Page 46

67. The Intervention for restoration of heath in early pathogenic phase falls under which type of Prevention.

a. Primordial Prevention
b. Health Promotion
c. Specific Protection
d. Primary Prevention
e. Secondary Prevention

Topic: Genetics counseling of Parents
Subtopic: Early Diagnosis
Difficulty level: Moderate
Cognitive level: C2
Reference: Community Medicine & Public Health 8th Page 338-339

68. Carrier gene frequency of Thalassemia is very high in our community. For prevention of this, at which state, the genetic counseling will be most beneficial?

a. Married couples
b. Pre-conceptual,
c. Post-conceptual
d. Neo-natal
e. Pre-marital

Topic: Nutritional Anemia
Subtopic: Iron deficiency Anemia
Difficulty level: Hard
Cognitive level: C2
Reference: PSM K Park 24th ed Page 660

69. The most effective strategy for prevention of iron deficiency anemia for scattered, remote and marginalized population:

a. Health education
b. Food supplements
c. Food fortification
d. Interpersonal communication
e. Iron supplements

BEHAVIORAL SCIENCES

Topic: Psychological counseling of patients and their families
Subtopic: Counseling
Difficulty level: Easy
Cognitive level: C1
Reference: page 14, HANDBOOK OF BEHAVIOURAL SCIENCES 3RD EDITION

70. A worried mother comes to you for counseling as her 8-year-old child has bed wetting problem. She has her own idea about counseling. While clearing her concepts about counseling which of the following would be most INAPPROPRIATE?

a. Counseling is about helping patients, help themselves
b. A straight advice is given to make people feel and function better
c. During counseling session invalidating patient's feeling is discouraged
d. There is no comparison between counselor and patient's experiences
e. There is no intent of making people less emotional after the session

Topic: Biological Basis of Behaviour
Subtopic: Anatomy of Memory
Difficulty level: Moderate
Cognitive level: C2
Reference: page 77, HANDBOOK OF BEHAVIOURAL SCIENCES 3RD EDITION

71. A 70-year-old man is facing difficulty in remembering new things, which of the brain areas are involved in it?

a. Hippocampus and amygdala
b. Singulate gyrus
c. Frontal lobe
d. Occipital lobe
e. Parietal lobe

Topic: Psychology and Disease
Subtopic: Role of psychological factors in precipitation of illness
Difficulty level: Moderate
Cognitive level: C2
Reference: page 63, HANDBOOK OF BEHAVIOURAL SCIENCES 3RD EDITION

72. Physiological processes in human are directly affected by psychological stress which includes?

a. Immune system
b. Personality issues
c. Belief system
d. Doctor patient relationship
e. Psychosocial development

Topic: Behavioural factors & Pharmacological Treatment
Subtopic: Health belief model
Difficulty level: Easy
Cognitive level: C1
Reference: page 138-139, HANDBOOK OF BEHAVIOURAL SCIENCES 3RD EDITION

73. Health belief model is about:

a. Dealing with biological factors of disease
b. Just dealing with psychological factors of disease
c. Cultural understanding of disease and ownership of health care plan
d. Not giving value to patient's cultural background
e. Imposing health care plan to which patient does not agree

Topic: Stress
Subtopic: Physiological effects of stress
Difficulty level: Easy
Cognitive level: C1
Reference: page 223, HANDBOOK OF BEHAVIOURAL SCIENCES 3RD EDITION

74. Which of the following is symptom of stress related to central nervous system?

a. Peptic ulcer
b. Asthma
c. Amenorrhea
d. Abdominal pain
e. Tension headache

PATHOLOGY

Topic: Cell injury
Subtopic: Calcification
Difficulty level: Moderate
Cognitive level: C2
Reference: Robbins PATHOLOGY, page 65, Chapter2

75. A 45-year-old patient presented with ovarian carcinoma. His histopathology report revealed that epithelial tumor has laminated calcified bodies (psamoma bodies). What type of cellular change is this?

a. Dystrophic calcification
b. Metastatic calcification
c. Hypertrophy
d. Hyperplasia
e. Metaplasia

Topic: Sterilization & disinfection
Subtopic: Chemical disinfectants
Difficulty level: Moderate
Cognitive level: C2
Reference: page 101, chapter 13, sterilization n& disinfection, Levinson 13th ed

76. Laboratory technician was asked to sterilize endoscope for use in Gastric clinic. The best chemical agent for this purpose is

a. Hydrogen peroxide
b. Formaldehyde
c. Glutaraldehyde
d. Chlorhexidine
e. Iodine

Topic: Cell injury
Subtopic: Apoptosis
Difficulty level: Moderate
Cognitive level: C2
Reference: page 57-8, Chapter2, Robbins

77. Chemotherapeutic agent is used to treat malignant epithelial tumor. After chemotherapy, there is reduction in tumor size. Which mechanism is responsible for reduction of tumor?

a. Apoptosis
b. Atrophy
c. Pigmentation
d. Calcification
e. Necrosis

Topic: Introduction to microorganisms
Subtopic: Cell wall of gram positive and gram-negative bacteria
Difficulty level: Moderate
Cognitive level: C2
Reference: Reference: page 4-12, chapter 2, Levinson 13th ed

78. Which of the following is the major structural difference between gram negative and gram-positive cell wall?

a. Gram negative bacteria have thin peptidoglycan layer whereas gram positive have thick layer
b. Gram negative bacteria carries plasmids whereas gram positive bacteria do not.
c. Gram negative bacteria have capsule whereas gram positive bacteria do not.
d. Gram negative bacteria have techoic acid whereas gram positive bacteria do not.
e. Gram negative bacteria are spore forming whereas gram positive bacteria do not.

Topic: Introduction to microorganisms
Subtopic: Growth curve
Difficulty level: Easy
Cognitive level: C1
Reference: page 15, chapter3, Levinson 13 ed

79. In which one of the bacterial growth curve phases, penicillin is most effective?

a. Lag phase
b. Log phase
c. Stationary phase

d. Decline phase
e. Death phase

Topic: Blood cells, platelets and blood group
Subtopic: Anemia
Difficulty level: Moderate
Cognitive level: C2
Reference: page 649, chapter14, Robins

80. A 23-year-old pale looking pregnant lady presented in gynecological OPD with complaints of breathlessness and easy fatigue with no previous history of any chronic illness. The peripheral blood picture revealed microcytic hypochromic RBCs with normal WBC and Platelet count. What is the most likely diagnosis?

a. Iron deficiency anemia
b. Megaloblastic anemia
c. Sickle cell anemia
d. Anemia of chronic disease
e. Aplastic anemia

PHARMACOLOGY

Topic: General Pharmacology
Subtopic: Pharmacodynamics
Difficulty level: Easy
Cognitive level: C1
Reference: Katzung & Trevor's Pharmacology edition 11; Page no 1

81. Which of the following denotes the actions of the drug on the body, such as mechanism of action, therapeutic and toxic effects?

a. Absorption
b. Metabolism
c. Pharmacology
d. Pharmacokinetics
e. Pharmacodynamics

Topic: General Pharmacology
Subtopic: Pharmacokinetics
Difficulty level: Easy
Cognitive level: C1
Reference: Katzung & Trevor's Pharmacology edition 12; Page no 26

82. Bioavailability of a drug is defined as:

a. Time required by a drug to reduce to 50% of its previous plasma concentration.
b. Total amount of the drug in the body to its plasma concentration
c. Fraction of the drug that reaches the systemic circulation in unchanged form
d. The maximum and minimum drug concentrations achieved during repeated dosing cycles
e. The ratio of the rate of elimination of a drug to the concentration of the drug in the plasma

Topic: General Pharmacology
Subtopic: Pharmacodynamics
Difficulty level: Hard
Cognitive level: C1
Reference: Katzung Basic and clinical Pharmacology edition 12; Page no 23

83. Trans-membrane receptors after activation by an appropriate ligand activate separate cytoplasmic tyrosine kinase molecules (JAKs). Which of the following drug acts by phosphorylating STAT molecules and lead to regulate transcription?

a. Insulin
b. Corticosteroids

c. Vitamin D
d. Acetylcholine
e. Cytokines

Topic: Autonomic nervous system
Subtopic: Sympathetic nervous system
Difficulty level: Easy
Cognitive level: C1
Reference: Katzung Basic and clinical Pharmacology edition 12; Page no 52

84. Beta-2 receptors are located at:

a. Cardiac muscle
b. Juxtaglomerular apparatus
c. Adipose tissue
d. Smooth muscle, liver and heart
e. Effector tissues

Topic: Hematopoietic system
Subtopic: Anemia
Difficulty level: Easy
Cognitive level: C1
Reference: Katzung Basic and clinical Pharmacology edition 12; Page no 280

85. If a woman has macrocytic anemia, an increased serum concentration of transferrin, and a normal serum concentration of vitamin B12, the most likely cause of her anemia is deficiency of which of the following?

a. Cobalamin
b. Erythropoietin
c. Folic acid
d. Intrinsic factor
e. Iron

MBBS 1ST PROFESSIONAL
MODULAR INTEGRATED 2K23
Block-III
(Multiple Choice Questions)

Total Marks: **85**
Time Allowed: **110 MINUTES**

ANATOMY

Topic: Gross Anatomy
Subtopic: Mediastinum
Difficulty level: Moderate
Cognitive level: C2
Reference: Snell's Clinical Anatomy by Regions, 9th Edition; Page no. 59

Q.1 A 14-year-old boy came in emergency department after a fight with mild bleeding just above the collar bone. On examination a stab wound was found just above his right clavicle. What important structure lies there?

a) Apex of lung
b) Root of lung
c) Internal thoracic artery
d) Tracheal bifurcation
e) Superior vena cava

Topic: Gross Anatomy
Subtopic: Pericardial sinuses
Difficulty level: Moderate
Cognitive level: C2
Reference: Snell's Clinical Anatomy by Regions, 9th Edition; Page no. 79

Q.2 During cardiac surgery of a 45-year-old male the cardiac surgeon can place her fingers in the transverse pericardial sinus, if necessary. This allows the surgeon to easily place a vascular clamp upon

a) Right and left pulmonary veins
b) Superior and inferior vena cava
c) Right and left coronary arteries
d) Pulmonary trunk and ascending aorta
e) Pulmonary trunk and superior vena cava

Topic: Gross Anatomy
Subtopic: Heart
Difficulty level: Easy
Cognitive level: C1
Reference: Snell's Clinical Anatomy by Regions, 9th Edition; Page no. 85

Q.3 A 54-year-old male is diagnosed with atrial fibrillation. Sinoatrial node Which is source of electrical conductivity of heart is located in:

a) Inferior rim of fossa ovalis
b) Septal cusp of tricuspid valve
c) Triangle of Koch
d) Upper part of crista terminalis
e) Valve of coronary sinus

Topic: Gross Anatomy
Subtopic: Heart
Difficulty level: easy
Cognitive level: C1
Reference: Snell's Clinical Anatomy by Regions, 9th Edition; Page no. 90

Q.4 A 72-year-old male is admitted to the hospital with complaints of severe chest pain radiating to his left arm. Which of the following nerves is responsible for the radiation of pain to the arm during myocardial infarction?

a) Phrenic
b) Vagus
c) Intercostobrachial
d) Greater splanchnic
e) Suprascapular

Topic: Gross Anatomy
Subtopic: Thoracic outlet
Difficulty level: Moderate
Cognitive level: C2
Reference: Snell's Clinical Anatomy by Regions, 9th Edition; Page no. 39

Q.5 **A 4-year-old boy came in pediatric OPD with pain on medial side of forearm and hand. Pediatrician also noticed wasting of the small muscles of the hand. On investigation, cervical rib was identified. Which structure is most likely compressed:**

a) Common carotid artery
b) Internal thoracic artery
c) Lower trunk of brachial plexus
d) Phrenic nerve
e) Recurrent laryngeal branch of left vagus nerve

Topic: Gross Anatomy
Subtopic: Larynx
Difficulty level: Moderate
Cognitive level: C2
Reference: Snell's Clinical Anatomy by Regions, 9th Edition; Page no. 650

Q.6 **A young lady was diagnosed to have thyroid cancer and underwent partial thyroidectomy. Postoperatively she developed a weakness of voice. This is most likely due to injury to:**

a) External laryngeal nerve
b) Inferior laryngeal nerve
c) Internal laryngeal nerve
d) Recurrent laryngeal nerve
e) Superior laryngeal nerve

Topic: Gross Anatomy
Subtopic: Diaphragm
Difficulty level: Moderate
Cognitive level: C2
Reference: Snell's Clinical Anatomy by Regions, 9th Edition; Page no. 46

Q.7 **A young boy in a fight was brought to the hospital emergency with profuse bleeding from a slit open wound in his right lower neck. He had abnormal respiratory movements. Examination revealed ascent of right dome of diaphragm during inspiration. The nerve/s most likely injured in this case is/are:**

a) Bronchial nerve
b) Intercostal nerve
c) Mediastinal branches of vagus nerve
d) Phrenic nerve
e) Trunks of cervical plexus

Topic: Gross Anatomy
Subtopic: Lungs
Difficulty level: Hard
Cognitive level: C1
Reference: Snell's Clinical Anatomy by Regions, 9th Edition; Page no. 78

Q.8 **In Bronchogenic carcinoma, lymphatic spread via bronchomediastinal trunks may result in early involvement of:**

a) Anterior cervical lymph nodes
b) Aortic lymph nodes
c) Lower deep cervical lymph nodes
d) Paratracheal lymph nodes
e) Superficial cervical lymph nodes

Topic: Histology
Subtopic: Blood vessels
Difficulty level: Hard
Cognitive level: C3
Reference: Laiq Hussain Siddiqui, General Histology 5th Revised Edition; Page no. 142

Q.9 **A 50-year-old presented with a history of shortness of breath and sweating upon exertion. Investigation revealed partial occlusion of two arteries by plaques, supplying the heart. The most likely underlying cause is:**

a) Atheroma in tunica media of vessels
b) Deposition of lipid material in tunica intima of arteries
c) Loss of elasticity of arterial wall
d) Progressive degenerative changes in subendothelial connective tissue

e) Thickening in tunica adventitia of arterial wall

Topic: Histology
Subtopic: Respiratory Epithelium
Difficulty level: Easy
Cognitive level: C1
Reference: Laiq Hussain Siddiqui, General Histology 5th Revised Edition; Page no 191

Q.10 First year student is given a slide of respiratory tract whose epithelium is characterized by:

a) Dense avascular lamina propria
b) Interspersed sustentacular cells
c) Pseudostratified columnar epithelium with stereocilia
d) Scattered olfactory cells
e) Thick basal lamina

Topic: Embryology
Subtopic: Heart tube
Difficulty level: Moderate
Cognitive level: C2
Reference: Langman's Medical Embryology, 12th Edition; Page no. 167

Q.11 A child is born with severe craniofacial defects and transposition of the great vessels. What cell population may play a role in both abnormalities

a) Ectoderm
b) Endoderm
c) Mesoderm
d) Neural crest cells
e) Hypoblast

Topic: Embryology
Subtopic: Sinus venosus
Difficulty level: Easy
Cognitive level: C1
Reference: Langman's Medical Embryology, 12th Edition; Page no. 170

Q.12 While examining a child for congenital heart defects, the professor asks the first-year internee about the structure derived from the left horn of sinus venosus:

a) Conus cordis
b) Coronary sinus
c) Sinus venarum
d) Septum spurium
e) Valve of inferior vena cava

Topic: Embryology
Subtopic: Development of veins
Difficulty level: Moderate
Cognitive level: C2
Reference: Langman's Medical Embryology, 12th Edition; Page no. 210

Q.13 Vitelline veins that carry blood from yolk sac to sinus venosus forms anastomotic network around dudenum that develops into

a) Azygous vein
b) Internal jugular vein
c) Left brachiocephalic vein
d) Proximal segment of superior vena cava
e) Portal vein

Topic: Embryology
Subtopic: Developmental defects of heart and vessels
Difficulty level: Moderate
Cognitive level: C2
Reference: Langman's Medical Embryology, 12th Edition; Page no. 189

Q.14 A premature newborn had respiratory difficulties. Examination and investigations revealed a congenital anomaly resulting from failure of normal involution of a fetal vessel connecting pulmonary and systemic circulations. The vessel most likely involved in this anomaly is:

a) Ductus arteriosus

b) Ductus venosus
c) First aortic arch artery
d) Left vitelline artery
e) Right superior cardinal vein

Topic: Embryology
Subtopic: Diaphragm
Difficulty level: Hard
Cognitive level: C3
Reference: Langman's Medical Embryology, 12th Edition; Page no. 93

Q.15 On examination of X-ray chest of a child with complaints of cyanosis, abnormal chest development is seen with one side being larger than the other and abdomen that appears caved in. The child is diagnosed with Congenital diaphragmatic hernia. The anatomical basis for cyanosis in this case is:

a) Omphalocele
b) Congenital hypertrophic pyloric stenosis
c) Eventration of diaphragm
d) Oligohydramnios
e) Pulmonary hypoplasia

Topic: Embryology
Subtopic: Lungs
Difficulty level: moderate
Cognitive level: C2
Reference: Langman's Medical Embryology, 12th Edition; Page no. 219

Q.16 A prenatal ultrasound revealed polyhydramnios, and at birth, the baby had excessive fluids in its mouth. What type of birth defect might be present?

a) Atrial septal defect
b) Anal atresia
c) Congenital cyst of lung
d) Tracheoesophageal atresia
e) Ventricular septal defect

PHYSIOLOGY

Topic: CVS
Subtopic: Local Control of Blood Flow
Difficulty Level: Moderate
Cognitive level: C2

Q.17 Which of the following is expected to occur in response to an increase in shear stress in a blood vessel?

a) Decreased prostacyclin production
b) Decreased endothelin production
c) Decreased cGMP production
d) Increased nitric oxide release
e) Increased renin production

(Reference: Guyton & Hall 14th Ed; Chapter 17: Page 210)

Topic: CVS
Subtopic: Local Control of Blood Flow
Difficulty Level: Moderate
Cognitive level: C2

Q.18 Which of the following chemicals must be blocked to produce vasodilation in a blood vessel?

a) Adenosine
b) Adenosine phosphate
c) Histamine

d) Nitric oxide
e) Endothelin

(Reference: Guyton & Hall 14th Ed; Chapter 17: Page 206-210)

Topic: CVS
Subtopic: Shock
Difficulty Level: Hard
Cognitive level: C3

Q.19 A 35-year-old patient was operated under spinal anesthesia. One hour after surgery a large decrease in arterial pressure was observed. There was no history of excessive blood loss during and after surgery. What is the most likely cause of shock in this condition?

a) Brain damage
b) Blockage of sympathetic outflow
c) Reduced parasympathetic stimulation
d) Generalized toxemia
e) Depression of vasomotor center

(Reference: Guyton & Hall 14th Ed, Chapter 24, Page 300)

Topic: CVS
Subtopic: Shock
Difficulty Level: Hard
Cognitive level: C3

Q.20 A 25-year-old woman is brought to the emergency after excessive blood loss during childbirth. Her pulse rate is 110/min, blood pressure is 60/40 mm Hg and her hands and feet are cold. Her condition does not improve after initial treatment. Which of the following factors causes progression of the shock in her condition?

a) Cardiac depression
b) Decreased capillary permeability.
c) Stress relaxation of vein
d) Increased secretion of vasopressin
e) Increased secretion of renin by the kidneys

(Reference: Guyton & Hall 14th Ed, Chapter 24, Page 296)

Topic: CVS
Subtopic: Shock
Difficulty Level: Easy
Cognitive level: C1

Q.21 A 45-year-old male developed circulatory shock but his cardiac output increased. What could be the type of shock?

a) Septic
b) Anaphylactic
c) Hemorrhagic
d) Cardiogenic
e) Neurogenic

(Reference: Guyton & Hall 14th Ed, Chapter 24, Page 300)

Topic: CVS
Subtopic: Types of Blood vessels
Difficulty Level: Easy
Cognitive level: C1

Q.22 The blood flowing in the vascular system is called laminar flow when:

a) The rate of blood flow becomes too great
b) It passes over an obstruction in the vessel
c) It makes a sharp turn while passing through the vessels
d) It passes over a rough endothelial surface
e) Central most portion of the blood stays in center

(Reference: Guyton & Hall, 14th Ed. Chapter 14, Page 175)

Topic: Cardiovascular System
Subtopic: Cardiac Cycle

Difficulty level: Moderate
Cognitive level: C2

Q.23 A young man is undergoing a medical fitness exam. His investigations show a stroke volume of 70ml and an end diastolic volume of 120 ml. His end systolic volume will be:

a) 20 ml
b) 30 ml
c) 40 ml
d) 50 ml
e) 60 ml

(Reference: Guyton & Hall, 14th Ed. Page 119)

Topic: Cardiovascular System
Subtopic: Cardiac Output
Difficulty level: easy
Cognitive level: C1

Q.24 Cardiac output is increased maximally during:

a) Intake of meals
b) Excitement
c) Anxiety
d) Fever
e) Exercise

(Reference: Guyton & Hall, 14th Ed. Page 247)

Topic: Cardiovascular System
Subtopic: Heart sounds
Difficulty level: Moderate
Cognitive level: C2

Q.25 A 22-year-old medical student auscultates the chest of a healthy subject and identifies the first heart sound. This sound corresponds to which phase to the cardiac cycle?

a) Atrial systole
b) Isovolumic contraction
c) Isovolumic relaxation
d) Rapid ejection
e) Atrial distole

(Reference: Guyton & Hall 14th Ed; chapter 23 page 283)

Topic: Cardiovascular System
Subtopic: Regulation of BP
Difficulty level: Moderate
Cognitive level: C2

Q.26 A 55-year-old man is having a high intracranial pressure. Blood flow to his brain will be maintained by:

a) Baroreceptor reflex
b) Chemoreceptor
c) Bain Bridge reflex
d) Cushing's reaction
e) Atrial volume reflex

(Reference: Guyton & Hall, 14th Ed. Page 226)

Topic: CVS
Subtopic: Blood pressure
Difficulty level: Moderate
Cognitive level: C2

Q.27 Arterial pressure of a 40-year-old man is measured by auscultatory method using mercury sphygmomanometer. The systolic pressure is 140 mmHg and diastolic pressure is 110 mmHg. His mean arterial pressure will be:

a) 110 mmHg
b) 120 mmHg
c) 125 mmHg
d) 130 mmHg
e) 140 mmHg

(Reference: Guyton & Hall, 14th Ed. Pg # 221-222)

Topic: CVS
Subtopic: Arrhythmias
Difficulty level: Hard
Cognitive level: C3

Q.28 A scientist is studying the phenomenon of ventricular fibrillation in an experimental animal. Which of the following factors can decrease the risk of this condition?

a) An increased size of the heart
b) An increased ventricular refractory period
c) Decreased electrical conduction velocity
d) Exposure of the heart to 60-cycle alternating current
e) Epinephrine administration

(Ref: Guyton & Hall 14th edition, chapter 13, page 163)

Topic: CVS
Subtopic: Arrhythmias
Difficulty level: Hard
Cognitive level: C3

Q.29 A 50-year-old man having fainting spells for a few days is placed on a 24-hour ECG monitoring. During the episodes, his ECG shows a ventricular rate of 25 beats/min and 100 P waves per minute. After about 30 seconds of fainting, a normal sinus rhythm recurs. What is his likely diagnosis?

a) Atrial flutter
b) First-degree A-V block
c) Second-degree A-V block
d) Ventricular fibrillation
e) Stokes-Adams syndrome

(Ref: Guyton & Hall 14th edition, chapter 15, page 188)

Topic: CVS
Subtopic: Arrhythmias
Difficulty level: Hard
Cognitive level: C3

Q.30 A young girl presents in the emergency with shortness of breath and palpitations. Her pulse is regularly irregular, and ECG shows a PR interval of 0.22 second. This is indicative of:

a) Atrial fibrillation.
b) Complete AV dissociation.
c) First degree AV block
d) Sinoatrial block
e) Ventricular fibrillation

(Ref: Guyton & Hall 14th edition, chapter 13, page 158)

Topic: CVS
Subtopic: Arrhythmias
Difficulty level: Moderate
Cognitive level: C2

Q.31 A 55-year-old female is having a pre-operative assessment for a laparoscopic cholecystectomy in which her ECG shows Q waves in chest leads V1 to V4. This is likely to depict:

a) 2nd degree AV block
b) An old infarct
c) SA nodal block
d) Ventricular fibrillation

(Ref: Guyton & Hall 14th edition, chapter 13, page 155)

Topic: Respiration
Subtopic: Regulation of Respiration
Difficulty Level: hard
Cognitive level: C3

Q.32 A 55-year-old man is brought to the emergency. His arterial blood gas analysis shows a PO_2 of 70 mmHg. Which of the following receptors will respond to this fall in PO_2?

a) Receptor in pons
b) J receptors
c) Pulmonary stretch receptors
d) Medullary chemoreceptors
e) Peripheral chemoreceptors

(Reference: Guyton & Hall; 14th Ed. Chapter 42: Page 534)

Topic: Respiration
Subtopic: Regulation of Respiration
Difficulty Level: Moderate
Cognitive level: C2

Q.33 A 50-year-old man is sitting and reading the newspaper. Which of the following respiratory neurons will be inactive during this process?

a) Dorsal respiratory group of neurons
b) Ventral respiratory group of neurons
c) Apneustic Center
d) Pneumotaxic center
e) Nuclei near tractus solitarius

(Reference: Guyton & Hall; 14th Ed. Chapter 42: Page 530)

Topic: Respiration
Subtopic: Restrictive lung disease
Difficulty level: Moderate
Cognitive level: C2

Q.34 A patient is suffering from pulmonary fibrosis. His spirometry will show increased:

a) Residual volume
b) Functional residual capacity
c) Forced vital capacity (FVC)
d) Forced expiratory volume in first second (FEV_1)
e) FEV_1/FVC ratio

(Reference: Guyton & Hall, 14th Ed. Page 543)

Topic: Respiration
Subtopic: High Altitude Physiology
Difficulty level: Moderate
Cognitive level: C2

Q.35 A person residing at high altitude for a long period develops chronic mountain sickness. He will have a decreased:

a) Red cell mass
b) Pulmonary arterial pressure
c) Right ventricular size
d) Peripheral arterial pressure
e) Pulmonary arterial resistance

(Reference: Guyton & Hall, 14th Ed. Page 557)

Topic: Respiration
Subtopic: Pulmonary ventilation
Difficulty level: Easy
Cognitive level: C1

Q.36 Which of the following changes occurs in the thoracic cavity when the diaphragm contracts?

a) Anteroposterior diameter of thorax is increased
b) Anteroposterior diameter of thorax is decreased
c) Vertical diameter of thorax is increased
d) Vertical diameter of thorax is decreased
e) Both anteroposterior and vertical diameter of thorax are increased

(Reference: Guyton & Hall, 14th Ed. Pg #432)

Topic: Respiration
Subtopic: Pulmonary Ventilation
Difficulty level: Moderate
Cognitive level: C2

Q.37 A baby boy born at 6 months of gestational age has bluish color of the skin and rapid breathing. The underlying cause of his condition is:

a) Compression of umbilical cord
b) Decreased surface tension forces
c) Deficiency of surfactant
d) Increased lung compliance
e) Increased dead space volume

(Reference: Guyton & Hall, 14th Ed. Pg #494)

Topic: Respiratory System
Subtopic: Pulmonary Ventilation

Difficulty level: Moderate
Cognitive level: C2

Q.38 A 3-year-old boy choked on a bite of fruit and started having a bout of cough. Which of the following nerves will carry the afferent impulses from the respiratory passages in his condition?

a) Glossopharyngeal nerve.
b) Hypoglossal nerve.
c) Trigeminal nerve.
d) Vagus nerve.
e) Facial nerve

(Reference: Guyton & Hall, 14th Ed. Pg #499)

Topic: Respiration
Subtopic: Transport of gases
Difficulty level: Moderate
Cognitive level: C2

Q.39 The CO_2 is transported from the tissues to the lungs predominantly in the form of bicarbonate ion. Compared with arterial red blood cells, which of the following options best describes venous red blood cells?

	Intracellular Chloride Concentration	Cell Volume
a)	Decreased	Decreased
b)	Decreased	Increased
c)	Decreased	No change
d)	Increased	Decreased
e)	Increased	Increased

(Ref: Guyton & Hall 14th edition, chapter 41, page 528)

Topic: Respiration
Subtopic: Transport of gases
Difficulty level: Moderate
Cognitive level: C2

Q.40 A shift of the oxygen-hemoglobin dissociation curve to the right in the peripheral tissues enhances the release of O_2 from the blood in the tissues. This is known as:

a) Tissue oxygen buffer system
b) Bohr effect
c) Haldane Effect
d) Safety factor for diffusion of O_2
e) Respiratory exchange ratio

(Ref: Guyton & Hall 14th edition, chapter 41, page 526)

Topic: Respiration
Subtopic: Deep sea diving
Difficulty level: Moderate
Cognitive level: C2

Q.41 In a deep-sea diver, the volume of dissolved nitrogen (liter) at the depth of 100 feet is:

a) 1
b) 2
c) 3
d) 4
e) 5

(Ref: Guyton & Hall, 14th Ed. Page 563)

Topic: CVS
Subtopic: Cardiac output
Difficulty level: Easy
Cognitive level: C1

Q.42 The factor that mainly controls the cardiac output is:

a) Blood viscosity
b) Atrial pressure
c) Heart rate
d) Ventricular pressure
e) Venous return

(Ref: Guyton & Hall, 14th Ed. chapter 20; page 245)

Topic: CVS

Subtopic: Conducting system
Difficulty level: Moderate
Cognitive level: C2

Q.43 In the human heart, cardiac impulse is delayed in the AV node for 0.09 seconds. The basic reason for this delay is:

a) Membrane leakiness to sodium ions
b) Large size of A.V nodal fibers
c) Numerous gap junctions
d) Scanty gap junctions
e) Short refractory period

(Ref: Guyton & hall, 14th Ed. chapter 10, page 12)

Topic: CVS
Subtopic: Cardiac cycle
Difficulty level: Moderate
Cognitive level: C2

Q.44 Which of the following parameters is decreased by increasing the force of myocardial contraction in the cardiac cycle?

a) Cardiac output
b) Ejection fraction
c) End systolic volume
d) End diastolic volume
e) Stroke volume

(Ref: Guyton & Hall, 14th Ed. chapter 9: page 119-120)

Topic: CVS
Subtopic: Cardiac cycle
Difficulty level: Easy
Cognitive level: C1

Q.45 During cardiac cycle, pulmonary valve opens when right ventricular pressure just exceeds:

a) 3 mmHg
b) 8 mmHg
c) 25 mmHg
d) 80 mmHg
e) 120 mmHg

(Ref: Guyton & Hall, 14th Ed. Page 118)

Topic: CVS
Subtopic: Cardiac cycle
Difficulty level: Moderate
Cognitive level: C2

Q.46 When left ventricular pressure during the cardiac cycle rises above 80mmHg, there is:

a) Closure of mitral valve
b) Closure of tricuspid valve
c) Closure of aortic valve
d) Opening of aortic valve
e) Opening of pulmonary valve

(Ref: Guyton & Hall, 14th Ed. chapter 9 page 119)

Topic: CVS
Subtopic: ECG
Difficulty level: Moderate
Cognitive level: C2

Q.47 When the atria are completely depolarized and cardiac impulse is at the AV node, the ECG tracing at this instance will show:

a) S-T Segment
b) T-P Segment
c) P-R Segment
d) P-R interval
e) Q-T interval

(Ref: Guyton & Hall, 14th Ed. chapter 11, page 137)

BIOCHEMISTRY

Topic: Lipids
Subtopic: Chemistry of Cholesterol
Difficulty Level: Easy
Cognitive Level: C1

Q.48 Cholesterol is essential for normal membrane functions because it:

a) Cannot be made by higher organisms.
b) Spans the thickness of the bilayer.
c) Affects the fluidity of membranes.
d) Catalyzes lipid flip-flop in the bilayer.
e) Responsible for message transduction.

Reference: Lippincott's 8th Edi Pg No. 662

Topic: Lipids
Subtopic: Cholesterol metabolism
Difficulty Level: Moderate
Cognitive Level: C3

Q.49 A 45-year-old lady is being treated for coronary artery disease. For associated hypercholesterolemia, she is prescribed a group of drugs which inhibits an enzyme required for cholesterol biosynthesis. Which of the following enzymes is inhibited by the drug?

a) Methyl Malonyl CoA mutase
b) Propionyl CoA Reductase
c) HMG CoA Reductase
d) HMG CoA Synthase
e) Squalene synthase

Reference: Lippincott's 8th Edi Pg No. 669

Topic: Lipids
Subtopic: Chemistry of Lipids
Difficulty Level: Hard
Cognitive Level: C3

Q.50 A newborn infant had trouble breathing at birth. The infant was 3 months premature. The physicians treated the infant with a solution, which was directly injected into the lungs. Within seconds, the infant responded with much improved breathing. A major component of this solution is:

a) Phosphatidylcholine derivative
b) Phosphatidylethanolamine derivative
c) Phosphatidylserine derivative
d) Phosphatidylglycerol derivative
e) Phosphatidylinositol derivative

Reference: Lippincott's 8th Edi Pg No. 620

Topic: Phospholipids
Subtopic: Biochemical significance of Phospholipids
Difficulty Level: Moderate
Cognitive Level: C2

Q.51 Which of the following is present in bacterial cell membrane and stimulates antibody response which is used to diagnose its infection?

a) Phosphatidic acid
b) Phosphatidylserine
c) Cardiolipin
d) Plasmalogen
e) Platelet activating factor

Reference: Lippincott's 8th Edi Pg No. 202

Topic: Lipids
Subtopic: Chemistry of Lipids
Difficulty Level: Easy
Cognitive Level: C1

Q.52 5. The form in which most dietary lipids are packaged and exported in blood from intestinal mucosa to the periphery is as

a) Mixed micelles

b) Free triacylglycerol
c) Free fatty acids
d) Chylomicron
e) Diacyl glycerol

Reference: Lippincott's 8th Edi Pg No. 690

Topic: Lipids
Subtopic: Chemistry of Lipids
Difficulty Level: Easy
Cognitive Level: C1

Q.53 Which out of the following fatty acids is a precursor of prostaglandins?

a) Linoleic acid
b) Arachidonic acid
c) Eicosapentaenoic acid
d) Linolenic acid
e) Palmitic acid

Reference: Lippincott's 8th Edi Pg No. 646

Topic: Lipids
Subtopic: Structure of lipoproteins
Difficulty Level: Moderate
Cognitive Level: C2

Q.54 Lipoproteins facilitate the delivery of their lipid components from the liver to the periphery and keep them soluble. Which of the following is the correct arrangement of these molecules?

a) Hydrophobic head outside; hydrophilic tail inside
b) Hydrophobic tail outside; hydrophilic head inside
c) Hydrophilic head outside; hydrophobic tail inside
d) Hydrophilic tail outside; hydrophobic head inside
e) Hydrophilic tail outside; hydrophilic head inside

Reference: Lippincott's 7th Edi Pg No. 227

Topic: Lipids
Subtopic: Classification of fatty acids
Difficulty Level: Moderate
Cognitive Level: C3

Q.55 A child presents to the OPD with history of repeated chest infections. He is showing retarded growth. His mother says that she feels his skin is salty. He passes pale, large volume, foul smelling loose stools. Which of the following will be included in the supplements to make up for the deficiencies produced in his case?

a) Short and medium chain fatty acids
b) Short and long chain fatty acids
c) Medium and long chain fatty acids
d) Medium and very long chain fatty acids
e) Long and very long chain fatty acids

Reference: Lippincott's 7th Edi Pg No. 177

Topic: Lipids
Subtopic: Lipoproteins
Difficulty Level: Moderate
Cognitive Level: C2

Q.56 Which of the following lipoprotein particles are most likely responsible for the plaque formation in an arterial wall after being oxidized?

a) Chylomicrons
b) High density lipoproteins
c) Intermediate-density lipoproteins
d) Low density lipoproteins
e) Very-low-density lipoproteins

Reference: Lippincott's 8th Edi Pg No. 546

Topic: Enzymology
Subtopic: Clinical enzymology
Difficulty level: Moderate
Cognitive level: C2

Q.57 A patient was diagnosed to have acute MI. Which one of the following enzyme preparations is given I/V to dissolve the clot in his coronary artery?

a) Glucocerebrosidase
b) Heparin
c) Papain
d) Streptokinase
e) Urokinase

Reference: Harper's 32nd Edition pg No. 686

Topic: Enzymes
Subtopic: Isoenzymes
Difficulty level: Easy
Cognitive level: C1

Q.58 Which of the following statement describes isozymes:

a) They are catalytically active proteolytic degradation products of certain enzymes
b) They are catalytically inert enzymes of identical function in different cells.
c) They are molecular forms of enzymes catalyzing the same reaction in different cells.
d) They are enzymes of identical function that are isolated from different species
e) They are conformational isomers of multi-subunit regulatory proteins

Reference: Lippincott's 8th Edi Pg No. 221

Topic: Enzymes
Subtopic: Enzyme inhibition
Difficulty level: Hard
Cognitive level: C3

Q.59 A 10-year-old boy presents with vomiting, sweating, drooling, and a decreased heart rate. His friends state that he was in a corn field when it was sprayed by a crop duster. The chemical being sprayed was an organophosphate derivative that covalently binds to a cholinergic enzyme found at postsynaptic neuromuscular junction and inactivates it. What type of inhibition is being displayed?

a) Competitive
b) Noncompetitive
c) Irreversible
d) Feedback
e) Allosteric

Reference: Lippincott's 8th Edi Pg No.208

Topic: Enzymes
Subtopic: Enzyme kinetics
Difficulty level: Moderate
Cognitive level: C1

Q.60 A numerical value of Km reflects which of the following?

a) Concentration of the enzyme that gives half of Vmax
b) Concentration of the substate that gives half of Vmax
c) Half of the substrate concentration required to achieve Vmax
d) Total substrate concentration required to achieve Vmax
e) Dissociation constant for enzyme substrate complex.

Reference: Lippincott's 8th Edi Pg No.202

Topic: Enzymology
Subtopic: Enzyme inhibitors as drugs
Difficulty level: Moderate
Cognitive level: C3

Q.61 A competitive reversible inhibitor such as physostigmine is used to treat glaucoma and myasthenia gravis and to reverse anticholinergic syndrome. Based on this, which one of the following statements is true concerning the clinical implications of using physostigmine?

a) Use of the drug will decrease the Km of the targeted enzyme
b) Use of the drug will increase the Km of the targeted enzyme
c) Use of the drug will increase the Vmax of the targeted enzyme
d) Use of the drug will decrease the Vmax of the targeted enzyme
e) Use of the drug will increase both Km and Vmax of the targeted enzyme

Reference: Lippincott's 8th Edi Pg No.206

Topic: Enzymology
Subtopic: Cardiac markers
Difficulty level: Moderate
Cognitive level: C2

Q.62 A 70- year- old man was admitted to hospital emergency with a history of chest pain. Which one of the following enzymes will give you maximum information about myocardial ischemia?

a) Lactate dehydrogenase
b) ALT
c) CK-MB
d) ALP
e) Amylase.

Reference: Lippincott's 8th Edi Pg No.221

Topic: Acid base balance
Subtopic: Metabolic alkalosis (interpretation of ABGs)
Difficulty level: Hard
Cognitive level: C3

Q.63 In a man undergoing surgery, it was necessary to aspirate the contents of the upper gastrointestinal tract. After surgery, the following values were obtained from an arterial blood sample: pH 7.55, PCO2 52 mm Hg and HCO3 - 40 mmol/l. What is the underlying disorder?

a) Metabolic Acidosis
b) Respiratory Acidosis
c) Metabolic Alkalosis
d) Respiratory Alkalosis
e) Compensated Metabolic Acidosis.

Reference: Essentials of medical biochemistry by Mushtaq Ahmad 8th Edition, Vol II, Chap 14, Regulation of plasma pH and Acid based disturbance

Topic: Acid Base Balance
Subtopic: Respiratory acidosis
Difficulty level: Hard
Cognitive level: C3

Q.64 A 45-year-man is having chronic cough with difficulty in breathing for several weeks. He avoids visiting his physician regularly. Now with severe breathlessness, he visits the doctor. His arterial blood sample shows pH 7.2, PCO2 55 mmHg and HCO3 23 mmol/l. Which one of the following conditions DOES NOT cause the above picture?

a) Acute Asthma
b) Diaphragm paralysis
c) Chronic bronchitis
d) Obstructive sleep apnoea
e) Severe kyphoscoliosis.

Reference: Essentials of medical biochemistry by Mushtaq Ahmad 8th Edition, Vol II, Chap 14, Regulation of plasma pH and Acid based disturbance

Topic: Emphysema and elastin
Subtopic: Emphysema
Difficulty level: Moderate
Cognitive level: C2

Q.65 A 30-year-old woman presents with progressive dyspnea (shortness of breath). She has no history of cigarette smoking. Family history reveals that her sister also has problems with her lungs. Which one of the following etiologies most likely explains this patient's pulmonary symptoms?

a) Deficiency of ascorbic acid
b) Deficiency of α1-antitrypsin
c) Deficiency of prolyl hydroxylase
d) Deficiency of elastase
e) Deficiency of lysyl hydroxylase

Reference: Lippincott's 8th edition Pg No. 178

COMMUNITY MEDICINE & PUBLIC HEALTH

Topic: Epidemiology of Respiratory Diseases
Subtopic: The burden of respiratory diseases

Difficulty level: Moderate
Cognitive level: C2

Q.66 Respiratory diseases are commonly acquired by aerosolized droplets, spread by sneezing and coughing. Which ONE of the following types of respiratory disease out numbers others at global mortality ranking:

a) Pneumonia
b) Tuberculosis
c) Measles
d) Diphtheria
e) Pertussis

Reference: Page 782 Public Health and Community Medicine Ilyas Ansari 8th ed

Topic: Interaction of environment & Respiratory system
Subtopic: Effect of air pollutants on the respiratory system
Difficulty level: Moderate
Cognitive level: C2

Q.67 Acute Respiratory Infections are often classified by clinical syndromes depending upon the site of infection. They are referred to as ARI of upper (AURI) or lower (ALRI) respiratory tract based on which ONE of the following anatomical structures dividing into AURI or ALRI:

a) Palate
b) Epiglottis
c) Pharynx
d) Larynx
e) Bronchus

Reference: Page 177 PSM K Park 24th ed

Topic: Occupational Lung Diseases
Subtopic: Common respiratory diseases related to occupation
Difficulty level: Hard
Cognitive level: C1

Q.68 A particulate dust which is inhaled into the respiratory tract is called respirable dust. It is mainly responsible for causing 'Pneumoconiosis', if its size comes in which of the following range:

a) Less than 0.1 microns
b) Less than 5 microns
c) More than 5 microns
d) More than 100 microns
e) More than 150 microns

Reference: Page 842- PSM K Park 24th ed

Topic: Behavioral Change Interventions
Subtopic: Methods of behavioral change interventions
Difficulty level: Moderate
Cognitive level: C3

Q.69 A public health physician makes consultative meetings with health managers and policy makers to prioritize cardiovascular disease for prevention. This action is most appropriately considered as:

a) Motivation
b) Facilitation
c) Counseling
d) Awareness
e) Advocacy

Reference: K. Park 34

Topic: Prevention of cardiovascular diseases
Subtopic: Primordial Prevention
Difficulty level: Moderate
Cognitive level: C2

Q.70 The control of fat contents through promulgation of food legislation, in order to prevent cardiovascular disease in the community, is best matching with which category of prevention.

a) Primordial prevention

b) Primary prevention
c) Health promotion
d) Secondary prevention
e) Host defense

Reference: K. Park Page 46, 388

Topic: Non-Communicable diseases
Subtopic: Cardiovascular disease risk factors
Difficulty level: Easy
Cognitive level: C1

Q.71 During the last two decades, developing countries are facing the double burden of disease due to rapid rise of non-communicable diseases. The most significant risk factor associated with this is:

a) Improved social status
b) Access to multinational food chains
c) Sedentary Jobs habits
d) Increased consumption of fats
e) Increase in obesity

Reference: K. Park 383 -385

BEHAVIORAL SCIENCES

Topic: CVS

Topic: Respiratory System
Sub-topic: ARDS
Difficulty level: Moderate
Cognitive level: C1

Q.76 Histologic sections of lung tissue from an individual with adult respiratory distress syndrome (ARDS) are most likely to reveal:

a) Angioinvasive infiltrates of pleomorphic lymphoid cells
b) Deposits of needle-like crystals from the membranes of eosinophils
c) Infiltrating groups of malignant cells having intercellular bridges
d) Irregular membranes composed of edema, fibrin, and dead cells lining alveoli
e) Plexiform lesions within pulmonary arterioles

Reference: page no 496, chapter 13, Robbins 10 ed

Topic: Respiratory System
Sub-topic: ARDS
Difficulty level: Moderate
Cognitive level: C1

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e) Plexiform lesions within pulmonary arterioles

Reference: page no 496, chapter 13, Robbins 10 ed

Topic: CVS
Sub-topic: Atherosclerosis
Difficulty level: Moderate
Cognitive level: C2

Q.77 An autopsy study reveals that evidence for atheroma formation can begin even in children. The gross appearances of the aortas are recorded and compared with microscopic findings of atheroma formation. Which of the following is most likely to be the first visible gross evidence for the formation of an atheroma?

a) Thrombus
b) Fatty streak
c) Calcification
d) Hemorrhage
e) Exudate

Reference: page no 369, chapter 10, Robbins 10 ed

Topic: CVS
Sub-topic: MI
Difficulty level: Moderate
Cognitive level: C2

Q.78 Which one of the listed substances has the following characteristic serum changes following a myocardial infarction: levels begin to increase 4 to 6 hr after the onset of chest pain, reach maximal serum concentration in about 12 to 24 hr, and remain elevated for about 3 to 10 days?

a) AST (SGOT)
b) CPK isoenzyme MB
c) LDH (with isotype LDH1 greater than LDH2)
d) ALT (SGPT)
e) Troponin I

Reference: page no 416, chapter 11, Robbins 10 ed

Topic: CVS
Sub-topic: HTN
Difficulty level: Moderate
Cognitive level: C3

Q.79 A 57-year-old man has been having blood pressure measurements in the range of 160/95 to 180/110 mm Hg for many years. He has never taken any medications. A renal scan reveals kidneys of normal size for age. These findings with benign nephrosclerosis are most likely to occur with which of the following change?

a) Hyaline arteriolosclerosis
b) Monckeberg's medial calcific sclerosis
c) Complex calcified atherosclerosis
d) Arterial mural thrombosis
e) Hyperplastic arteriolosclerosis

Reference: page no 367, chapter 10, Robbins 10 ed

Topic: CVS
Sub-topic: Shock
Difficulty level: Moderate
Cognitive level: C2

Q.80 A 20-year-old man is brought to the emergency room after rupturing his spleen in a motorcycle accident. His blood pressure on admission is 80/60 mmHg. Analysis of arterial blood gases demonstrates metabolic acidosis. This patient is most likely suffering from which of the following conditions?

a) Acute pancreatitis

b) Cardiogenic shock
c) Hypersplenism
d) Hypovolemic shock
e) Septic shock.

Reference: page no 116, chapter 4, Robbins 10 ed

PHARMACOLOGY

Topic: Cardiovascular system
Subtopic: Antihypertensive drugs
Difficulty level: Easy
Cognitive level: C1
Reference: Basic and Clinical Pharmacology by Katzung; Chapter:11; Page: 183

Q.81 Which of the following drugs is a Calcium channel blocker used in treatment of hypertension:

a) Propranolol
b) Prazosin
c) Verapamil
d) Digoxin
e) Quinidine

Topic: Cardiovascular system
Subtopic: Anti-arrhythmic drugs
Difficulty level: Moderate
Cognitive level: C1

Reference: Basic and Clinical Pharmacology by Katzung; Chapter: 14; Page: 228

Q.82 The antiarrhythmic agent that primarily belongs to class Ia Na^+ channel group is:

a) Adenosine
b) Quinidine
c) Acebutolol
d) Amiodarone
e) Bepridil

Topic: Respiratory system
Subtopic: Cough suppressants
Difficulty level: Easy
Cognitive level: C1
Reference: Basic and Clinical Pharmacology by Katzung; Chapter: 20; Page: 356

Q.83 Centrally acting cough suppressant is:

a) Acetyl cysteine
b) Bromhexine
c) Carbapentate
d) Dextromethorphan
e) Liquorice

Topic: Respiratory system
Subtopic: Bronchial asthma
Difficulty level: Easy
Cognitive level: C1
Reference: Basic and Clinical Pharmacology by Katzung; Chapter: 20; Page: 351

Q.84 Anti-cholinergic agent that is used in the treatment of bronchial asthma is:

a) Ipratropium bromide
b) Trospium Chloride
c) Salbutamol
d) Zafirlukast
e) Prednisone

Topic: Histamine, serotonin, and ergot alkaloids
Subtopic: Histamine blockers (H1 blockers)
Difficulty level: Easy

Cognitive level: C1
Reference: Basic and Clinical Pharmacology by Katzung; Chapter: 16; Page: 275

Q.85 First generation antihistamines (H1 blockers) include which of the following drugs:

a) Cetirizine
b) Diphehydramine
c) Fexofenadine
d) Loratadine
e) Desloratidine

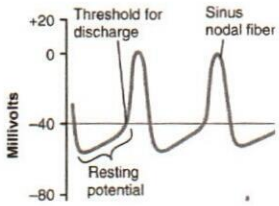
MBBS 1ST PROFESSIONAL
MODULAR INTEGRATED 2K23
(Short Essay Questions)

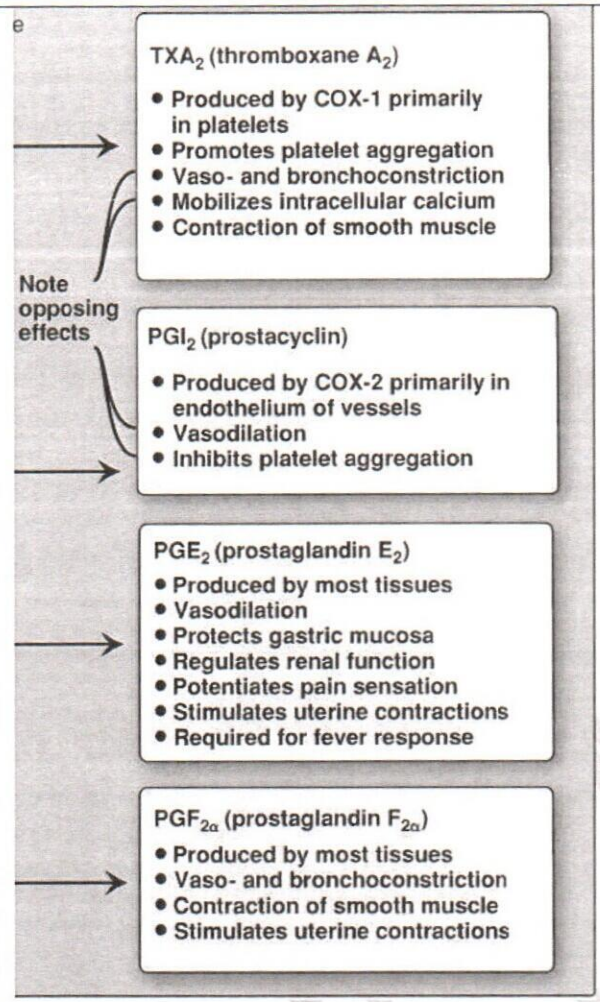
Max. Marks: **35**
Time Allowed: **70 MINUTES**

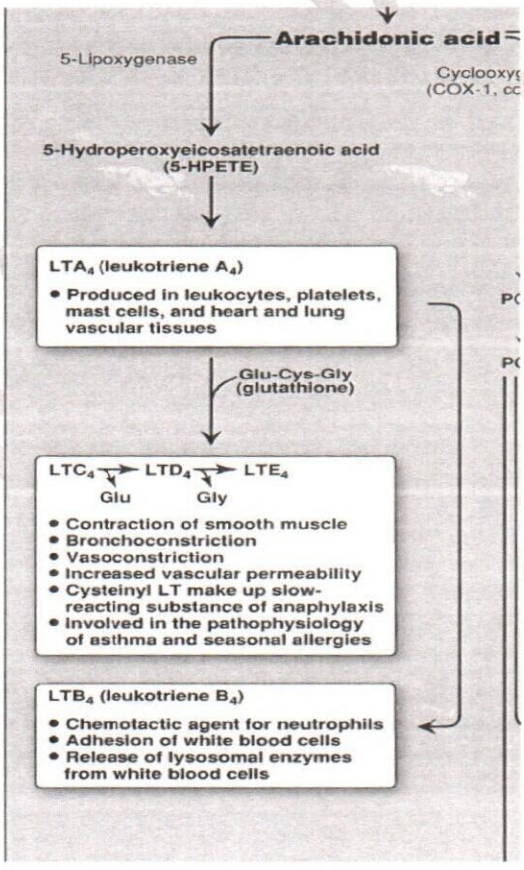
	ANATOMY	
	Topic: Gross Anatomy Subtopic: Bronchial tree Difficulty level: Moderate Cognitive level: C2	
1.	**An old man had a bout of cough and respiratory difficulties following aspiration of a piece of chicken bone. Which bronchus is more liable for foreign body lodgement and why? What are the common sites of bronchial tree it can descend into? What anatomical landmarks should be kept in mind by surgeon while operating on bronchopulmonary segments.** Answer key: 1. **Bronchus more liable for foreign body lodgment** **0.5** Right bronchus **Reason:** **1.5** It is wider, shorter, and more vertical than the left one. Thus, it is a more direct continuation of trachea. **Common sites of bronchial tree it can descend into:** **0.5** From here they usually pass into middle or lower lobe bronchi **Bronchopulmonary segments and their surgical correlates** These are anatomic, functional, and surgical units of lungs supplied by segmental (tertiary) bronchi. Each segment has its own segmental artery, lymph vessels, and autonomic nerves. **1.5** It is a structural unit, so diseased segment of lung can be resected surgically independent of other segments. **01** Reference: Snell's Clinical Anatomy by Regions, 9th Edition; Page no. 65, 66, 72	0.5,1.5,0.5 2.5
	Topic: Embryology Subtopic: Heart Difficulty level: Hard Cognitive level: C3	

2.	**A 4-week-old preterm infant brought to emergency with difficulty in breathing. On auscultation, doctor can appreciate the abnormal heart sound that may depict a hole in heart. Later on, electrocardiography confirms that the infant is suffering from congenital heart disease that gives an appearance of a hole in heart. Give the development of involved septum in this defect.** **Answer key:** **Development of Interatrial Septum** i. **Septum Primum** is a crescentic membrane which grows from the roof of primordial atrium to the fused endocardial cushions. A large opening **osteum primum** is located between its free crescentic edge and the fused endocardial cushions. **(02)** ii. This foramen reduces and disappears as septum primum fuses with endocardial cushions. Before the closure of foramen primum, perforations appear in the upper part of septum primum and form **osteum secundum.** **(01)** iii. **Septum Secundum** is a muscular fold, grows adjacent to septum primum on its right side. It overlaps osteum secundum. An oval opening **foramen ovale** is formed, which allows most blood from the right atrium to pass into the left atrium. Functional closure of oval foramen after birth, due to high pressure in left atrium than right. The value of oval foramen fuses with septum secundum. **(02)** **Reference: Langman's Medical Embryology, 12th Edition; Page no. 172, 182**	05
	PHYSIOLOGY	
	Topic: Cardiovascular system Subtopic: Shock Difficulty Level: Hard Cognitive level:C3	
1.	**A 32-year-old lady was brought to the emergency two days after an abortion in an unhygienic clinic. On examination she was drowsy, her temperature was 104 °F, BP was 70/50 mm Hg and pulse was rapid and thready. Name the type of shock she is suffering from. List the hemodynamic features and pathophysiology of this type of shock.** **Key:** Septic shock **(01)** Pathophysiology of Septic shock **(02)** It is due to widespread Bacterial infection in different parts of the body. Spread of infection is through the blood circulation. Most cases caused by Gram-positive bacteria. Endotoxin producing Gram-negative bacteria. In early stages of septic shock, the patient usually has signs of the bacterial infection As the infection becomes more severe, the circulatory system usually becomes involved because of direct extension of the infection or secondarily as a result of toxins from the bacteria, with resultant loss of plasma into the infected tissues through deteriorating blood capillary walls Hemodynamic features: **(02)** High grade fever, widespread vasodilatation, intravascular clotting in minute blood vessels High cardiac output in perhaps half of patients, caused by: arteriolar dilation in the infected tissues high metabolic rate vasodilation elsewhere in the body, resulting from bacterial toxin stimulation of cellular metabolism high body temperature Sludging of the blood, caused by RBC agglutination in response to degenerating tissues. Development of micro-blood clots in widespread areas of the body, a condition called disseminated intravascular coagulation. Hemorrhage occurs in many tissues, especially in the gut wall of the intestinal tract. Gram –ve bacilli grow and produce toxins which lead to endotoxic shock. Endotoxic shock, in this type a large part of gut is strangulated and loses its blood supply and becomes gangrenous. There finally comes a point at which deterioration of the circulation becomes progressive in the same way that progression occurs in all other types of shock. The end stages of septic shock are not greatly different from the end stages of hemorrhagic shock, even	01,02,02

	though the initiating factors are markedly different in the two conditions. **(0.25 marks/each point: Total 2.5marks for writing all points)** Reference: Guyton & Hall Textbook of Physiology Ed. 14, pg # 300	
	Topic: Cardiovascular system Subtopic: Heart blocks Difficulty Level: Moderate Cognitive level: C3	
2.	**A 60-year-old-man presents with episodes of fainting. During these episodes, his ECG shows dissociation between P wave and QRS complex. Which disorder is this man suffering from? What is the underlying physiological basis for his fainting spells? Enlist the common causes for development of this conduction abnormality.** **Key:** He is Suffering from stoker Adams syndrome (Third degree AV Block) **(01)** Complete AV block occurs abruptly & repeatedly when this occurs blood pressure falls. Blood flow to the brain decreases results into fainting ventricles develops their own rhythms (slow rate), with this patient recovers. **(02)** Ischemia of AV node or AV bundle fibers, compression of AV bundle, inflammation of the AV node or AV bundle, extreme stimulation of the heart by the vagus nerve, degeneration of the AV conduction system and medication such as digitalis or beta-adrenergic antagonists. **Reference: Guyton Page 158, Edition: 14th**	01,02,02
	Topic: Respiration Subtopic: Regulation of respiration Difficulty Level: Moderate Cognitive level: C2	
3.	**A 70-year-old male was brought to emergency department with shortness of breath. On examination, peripheral cyanosis was also noted. Arterial blood gas analysis showed that pH is slightly acidic, PO_2 is 85 mmHg and PCO_2 is 65 mmHg. Which receptors detect these changes in the level of respiratory gases and where are these located. What is the role of these receptors in regulation of respiration?** **Key:** Decreased arterial oxygen stimulates peripheral chemoreceptors located in the carotid and aortic bodies while excess CO_2 or excess H^+ in the blood mainly act directly on chemosensitive area of the respiratory center beneath the medulla's ventral surface. **01** **Role of peripheral chemoreceptors in regulation of respiration: 02** The carotid bodies located bilaterally in the bifurcations of the common carotid arteries send their afferent signal through Hering's nerves to glossopharyngeal nerves and then to the dorsal respiratory area of the medulla. The aortic bodies located along the arch of the aorta send their afferent nerve fibers through the vagi, also to the dorsal medullary respiratory area. When the oxygen concentration in the arterial blood falls below normal, the chemoreceptors become strongly stimulated. The stimulated peripheral chemoreceptors activate the dorsal medullary respiratory area to increase the alveolar ventilation. **Role of chemosensitive area in regulation of respiration: 02** The chemosensitive area located bilaterally beneath the ventral surface of the medulla is highly sensitive to changes in either blood pCO_2 or H^+ concentration, and it in turn excites the other portions of the respiratory center. The sensor neurons in the chemosensitive area are especially excited by H+. The H^+ may be the only important direct stimulus for these neurons. However, H^+ ions do not easily cross the blood–brain barrier. For this reason, changes in H^+ concentration in the blood have considerably less effect in stimulating the chemosensitive neurons than changes in blood CO_2. The CO_2 has little direct effect in stimulating the neurons in the chemosensitive area, it does have a potent indirect effect. The CO_2 passes through the blood–brain barrier very easily. The CO_2 reacts with the water of the tissues to form carbonic acid, which dissociates into H^+ and HCO_3^-; the H^+ then have a potent direct stimulatory effect on respiration. **Reference; Guyton and Hall 14th edition chapter 42 page 533**	01,02,02

	Topic: CVS Subtopic: SA node action potential and ventricular action potential Difficulty Level: Hard Cognitive level: C3	
4.	**Draw a diagram and explain the phases of an action potential in the SA nodal fibres. What happens to the action potential of SA nodal fibers, if voltage-gated Na+ channel blocker (tetrodotoxin) is applied to the cell?** **Key**	04,01
	Sino Atrial Nodal Action Potential: (02)  **RMP:** -55mv **(02)** RMP is unstable due to the inherent leakiness of SA Nodal membrane to sodium and Calcium ions leading to influx of positively charged sodium (funny" current) and Ca ions, causing a slow rise in the resting membrane potential in the positive direction till it reaches the threshold level. Pre-Potential Slope or spontaneous slow depolarization accounts for the Pacemaker activity of SA node i.e. Automaticity **Threshold:** At -40mv there is opening of voltage gated Slow Ca channels **Depolarization:** Slow calcium channels open, which cause influx of Calcium ions resulting in depolarization of SA node. There are no voltage gated Na channels in SA node. **Repolarization:** Opening of K channels result in efflux of K ions, and this causes repolarization to occur. **If tetrodotoxin is applied** to a myocardial auto rhythmic cell, nothing will happen because there are no voltage-gated Na+ channels in the SA nodal fiber **(01)** **(Reference Guyton & Hall, 14th Edition: Chapter 10; Page 128)**	
	BIOCHEMISTRY	
	Topic: Lipid Chemistry Subtopic: Arachidonic acid Difficulty Level: Moderate Cognitive level: C2	
1.	**A teenager, concerned about his weight, attempts to maintain a fat-free diet for a period of several weeks. If his ability to synthesize various lipids were to be examined, he would be found to be most deficient in his ability to synthesize prostaglandins. Deficiency of which fatty acid is responsible for the above scenario. Enlist the principal biological functions of thromboxane A2 and prostaglandins (any two) in platelet homeostasis. Write down the importance of leukotrienes in health & disease.** **KEY:** Deficient fatty acid: Linoleic acid (essential fatty acid) **01**	01,02, 02





Key: Reference: Lippincott's 8th Edition Pg No. 654

MBBS 1ST PROFESSIONAL
MODULAR INTEGRATED 2K23
Block-I
(Multiple Choice Questions)

Total Marks: **85**
Time Allowed: **110 MINUTES**

ANATOMY

Topic: General Histology
Subtopic: Cell organelles
Cognitive Level: C2
Difficulty Level: Moderate
Reference: Book: Medical Histology text & Atlas by Laiq Hussain - 8th Edition Chapter 2: The cell,pg 14

1. **A 1st year student is given a hematoxylin and eosin-stained slide. According to your knowledge which cellular structure will impart the hematoxylin stain to slide:**
   a. Mitochondria
   b. Ribosomes
   c. Rough endoplasmic reticulum
   d. Nucleus
   e. Nucleoplasm

Topic: General Histology
Subtopic: Cytoskeleton
Cognitive Level: C2
Difficulty Level: Moderate
Reference: Book: Medical Histology text &Atlas by Laiq Hussain - 8th Edition Chapter 2: The cell, page: 21

2. **A histopathologist is examining the slide of skin under light microscope. Which of the following intermediate filament is visible in this slide:**
   a. Actin filaments
   b. Desmin filaments
   c. Keratin filaments
   d. Vimentin Filaments
   e. Lamin filaments

Topic: General Histology
Subtopic: Epithelium
Cognitive Level: C3
Difficulty Level: Hard
Reference: Book: Medical Histology text &Atlas by Laiq Hussain - 8th Edition Chapter 3: Epithelium, page: 42

3. **A 35-year-old infertile female presented to medical OPD with chronic respiratory tract infections. Which of the following apical domain is defected in this condition of patient?**
   a. Cilia
   b. Flagella
   c. Microvilli
   d. Primary cilium
   e. Stereocilia

Topic: General Histology
Subtopic: Epithelium
Cognitive Level: C1
Difficulty Level: Easy
Reference: Book: Medical Histology text &Atlas by Laiq Hussain - 8th Edition Chapter 3: Epithelium, page: 37

4. **A medical student is examining a slide of urinary bladder. Which of the following is the characteristic feature of transitional epithelium?**
   a. Microvilli are seen.
   b. Pseudostratified epithelium
   c. Presence of goblet cells
   d. Single layered epithelium
   e. Umbrella cells are present.

Topic: General Histology
Subtopic: Connective tissue
Cognitive Level: C2
Difficulty Level: Moderate
Reference: Book: Medical Histology text &Atlas by Laiq Hussain - 8th Edition

Chapter 5: Connective Tissue, page: 51

5. **A female of 35 years went to her family doctor during month of March with complaints of running nose, repetitive bouts of sneezing and itchy eyes. He made a diagnosis of allergic rhinitis. Which of the following cells are responsible for her condition?**

   a) Basophils
   b) Eosinophils
   c) Mast cells
   d) Plasma cells
   e) Pericytes

   Topic: General Histology
   Subtopic: Connective tissue
   Cognitive Level: C2
   Difficulty Level: Moderate
   Reference: Book: Medical Histology text &Atlas by Laiq Hussain - 8th Edition
   Chapter 5: Connective Tissue, page: 54

6. **A 57-year-old male came in surgical OPD after 2 weeks of open appendectomy with complain of inflammation on scar. Which of the following types of fibers are accumulated in this inflammatory scar?**

   a. Collagen fibers
   b. Elastic fibers
   c. Elaunin fibers
   d. Oxytalan fibers
   e. Reticular fibers

   Topic: General Histology
   Subtopic: Glandular Epithelium
   Cognitive Level: C1
   Difficulty Level: Easy
   Reference: Book: Medical Histology text &Atlas by Laiq Hussain - 8th Edition
   Chapter4: Glands, page: 47

7. **A 25-year-old hyperthyroid girl complains about excessive sweating even in normal condition. What is the type of sweat gland?**

   a. Coiled Simple tubular gland
   b. Compound tubular gland
   c. Holocrine gland
   d. Simple acinar gland
   e. Straight simple tubular gland

   Topic: General Histology
   Subtopic: Cell junctions
   Cognitive Level: C2
   Difficulty Level: Moderate
   Reference: Book: Medical Histology text & Atlas by Laiq Hussain - 8th Edition
   Chapter 1: The Cell, page: 25

8. **During electron microscopic examination of an epithelium, a student identified a disc shaped electron dense attachment plaque on the plasma membrane of two opposing cells, this disc shaped plaque could be a part of**

   a. Fascia adherens
   b. Gap junction
   c. Macula adherens
   d. Zonula adherens
   e. Zonula occludens

   Topic: Special Histology
   Subtopic: Lymph node
   Cognitive Level: C1
   Difficulty Level: easy
   Reference: Book: Medical Histology text &Atlas by Laiq Hussain - 8th Edition
   Chapter 14: The Immune System and lymphoid organ, page: 143

9. **Section from a lymph node of 35-year-old male reveals a structure lined with cuboidal cells with their ovoid nuclei. This structure is:**

a. Medullary artery
b. Medullary vein
c. Capsular venules
d. High endothelial venules
e. Precapillary sphincter

Topic: Special Histology
Subtopic: Tonsil
Cognitive Level: C1
Difficulty Level: Easy
Reference: Book: Medical Histology text &Atlas by Laiq Hussain - 8th Edition
Chapter 14: The Immune System and lymphoid organ, page: 148

10. ENT surgeon sends a biopsy specimen of palatine tonsil. Which of the following is the characteristic feature that helps a histopathologist to identify the slide of palatine tonsil from other lymphoid organs?

a. Crypts lined with stratified squamous epithelium
b. Lymphoid nodules with germinal centers
c. Lymphoid nodules without germinal centers
d. Presence of diffuse lymphoid tissue
e. Connective tissue capsule having smooth muscles

Topic: General Embryology
Subtopic: Gametogenesis; Chromosomal abnormalities
Cognitive Level: C1
Difficulty Level: Easy
Reference: Book: Langman's Medical Embryology, Edition: 14th Edition, Chapter 2: Gametogenesis, page 21

11. On amniocentesis, it was detected that the fetus has chromosomal abnormality XXY which is also known as

a. DiGeorge Syndrome
b. Down's Syndrome
c. Edward's Syndrome
d. Klinefelter Syndrome
e. Patau Syndrome

Topic: General Embryology
Subtopic: Gametogenesis
Cognitive Level: C2
Difficulty Level: Moderate
Reference: Book: Langman's Medical Embryology, Edition: 14th Edition, Chapter 2: Gametogenesis, Page no: 14

12. Teratomas are tumors that often contain different tissues like bone, hair, muscle, gut epithelia and others because these tumors originate from

a. Hypoblast cells
b. Multipotent stem cells
c. Pluripotent stem cells
d. Totipotent stem cells
e. Trophoblast cells

Topic: General Embryology
Subtopic: First Week of Development: Ovulation to implantation
Cognitive Level: C3
Difficulty Level: Hard
Reference: Book: Langman's Medical Embryology, Edition: 14th Edition, Chapter 3, First Week of Development: Ovulation to implantation, Page 44

13. In a developing embryo craniofacial and cardiovascular abnormalities can develop due to defects in Anterior Visceral Endoderm which establishes:

a. Cranial-caudal polarity
b. Bilateral symmetry
c. Dorsal-ventral polarity
d. Left-right polarity.
e. Proximal-distal axis

Topic: General Embryology
Subtopic: Embryonic Period
Cognitive Level: C2
Difficulty Level: Moderate
Reference: Book: Langman's Medical Embryology, Edition: 14th Edition, Chapter 6: Third to Eighth Week of Development: The Embryonic Period, Page 76

14. A 4-year-old child presented with constipation and abdominal pain. On examination doctors found a mass in abdomen. On detailed investigation he was diagnosed with neuroblastoma. Which of the following cells are involved in this condition?

a. Dermis
b. Ectoderm
c. Neural Crest Cells
d. Neuroblasts
e. Notochord

Topic: General Embryology
Subtopic: First Week of Development
Cognitive Level: C1
Difficulty Level: Moderate
Reference: Book: Langman's Medical Embryology, Edition: 14th Edition, Chapter 3: First Week of Development: Ovulation to implantation, Page 37

15. One of the earliest tests that can be used to confirm pregnancy even at 2nd week of gestation is hCG levels in maternal blood. hCG is produced by:

a. Cytotrophoblast
b. Decidual Cells
c. Embryoblasts
d. Hypoblasts
e. Syncytiotrophoblast

Topic: General Embryology
Subtopic: Third Week of Development
Cognitive Level: C3
Difficulty Level: Hard
Reference: Book: Langman's Medical Embryology, Edition: 14th Edition, Chapter 5: Third Week of Development: Trilaminar Germ Disc, Page 66

16. An ultrasound scan detects a large mass near the sacrum of a 28-week female fetus. What might the origin of such a mass?

a. Allantois
b. Notochord
c. Primitive streak
d. Primary villi
e. Urachus

Topic: General Anatomy
Subtopic: Terms of movements
Cognitive level: C1
Difficulty level: Easy
Reference: General anatomy by Laiq Hussain Siddique, page no 18 ,3rd edition

17. A 4-year-old child fell from a bicycle. Presented to emergency with complain of severe pain in right foot while standing & walking. Upon examination he was unable to perform twisting motion of the right foot that turns sole inwards. This movement is:

a. Eversion
b. Inversion
c. Dorsiflexion
d. Protraction
e. Planter flexion

Topic: General anatomy
Subtopic: Classification of bone according to size and shape
Cognitive level: C1
Difficulty level: Easy
Reference: General anatomy by Laiq Hussain, 3rd edition, page 26

18. **On X- ray of a patient with fracture of hand, findings indicate fracture of miniature long bones which are:**
    a. Tarsals
    b. Scaphoid
    c. Pisiform
    d. Lunate
    e. Metacarpals

    Topic: General anatomy
    Subtopic: Integumentary system
    Cognitive level:C1
    Difficulty level: Easy
    Reference: Book: General anatomy by Laiq Hussain, 3rd edition, Page no. 107

19. **In a general anatomy class, medical students are taught about major functions of skin. One of the following functions is performed by the blood vessels of the skin which is:**
    a. Protective Barrier
    b. Temperature regulation
    c. Vitamin D production
    d. Metabolism
    e. Fatty acid synthesis

    Topic: General Anatomy
    Subtopic: Nervous System
    Cognitive level: C1
    Difficulty level: Easy
    Reference: Book; General anatomy by Laiq Hussain, 3rd edition, Page no.117

20. **A patient of multiple sclerosis came to outpatient for routine checkup, in this disease myelin sheath of nerve cells is damaged. Which of the following cells contribute to formation of myelin sheath in peripheral nervous system.**
    a. Oligodendrocytes
    b. Microglial cells
    c. Astrocytes
    d. Schwann cells
    e. Ependymal cells

PHYSIOLOGY

    Topic: Homeostasis
    Subtopic: Control systems of the body
    Cognition level: C1
    Difficulty level: Easy
    Reference: Guyton & Hall,14th Edition, page no 9, Chapter 1.

21. **During childbirth, stretching of the cervix sends signals through the uterine muscle back to the body of the uterus. This is an example of:**

    a. Adaptive control
    b. Automaticity
    c. Negative feedback control
    d. Positive feedback control
    e. Gain of a control system

    Topic: Cell
    Subtopic: Cell organelles
    Cognition level: C2
    Difficulty level: Moderate
    Reference: page 18, Chapter 2, Guyton 14th ed.

22. **A 45-year-old chronic alcoholic presents to the emergency department with symptoms of altered mental state and hallucinations. The alcohol in his blood will be detoxified by the hydrogen peroxide of peroxisomes in association with:**

    a. Caspase
    b. Catalase
    c. Glycosidase

d. Lipase
e. Protease

Topic: Cell
Subtopic: Remodelling
Difficulty level: Easy
Cognition level: C1
Reference: Page 22, Chapter 2 Guyton 14th ed.

23. Which of the following is a process by which obsolete organelles are degraded and recycled in a cell?

a. Apoptosis
b. Atrophy
c. Autophagy
d. Necrosis
e. Pyroptosis

Topic: Cell
Subtopic: Cell division
Cognition level: C2
Difficulty level: Moderate
Reference: Page 44, Chapter 3 Guyton 14th ed

24. A medical student is observing cell division under a specialized microscope. He can visualize the chromatids being pulled apart at the centromere and moving toward the poles. These cells are exhibiting:

a. Anaphase
b. Cytokinesis
c. Karyokinesis
d. Metaphase
e. Prophase

Topic: ANS
Subtopic: Receptors of ANS
Difficulty Level: Moderate
Cognition level: C2
Reference: Guyton & Hall,14th Edition; Page no 768, Chapter 61.

25. An experimental animal was given a drug that stimulates the alpha-adrenergic receptors. This will lead to:

a. Bladder sphincter relaxation
b. Constriction of iris
c. Intestinal muscle contraction
d. Intestinal sphincter relaxation
e. Vasoconstriction

Topic: ANS
Subtopic: Sympathetic nervous system
Difficulty Level: Moderate
Cognition level: C2
Reference: Guyton & Hall,14th Edition; Page no 769, Chapter 61.

26. A boy visited a circus and got scared upon seeing a lion. As a consequence of his fear, he will have a reduced:

a. Blood flow in gut.
b. Blood glucose concentration.
c. Heart rate.
d. Mental activity.
e. Sweating

Topic: ANS
Subtopic: Sympathetic nervous system
Difficulty Level: Moderate
Cognition level: C2
Reference: Guyton & Hall,14th Edition; Page no 764, Chapter 61.

27. A factory worker encountered an accident that led to an extensive damage to his lumbar spinal cord segments. The autonomic fibres lost in this injury will be:

a. Preganglionic parasympathetic fibers
b. Postganglionic parasympathetic fibers
c. Preganglionic sympathetic fibers
d. Postganglionic sympathetic fibers
e. Adrenergic sympathetic fibers

Topic: Blood
Subtopic: Platelets and Haemostasis
Difficulty level: Easy
Cognitive level: C1
Reference: Guyton and Hall, 14th Edition. Chapter: 37. Page No. 477-478

28. Which of the following is the correct sequence of events leading to blood clotting?

a. Coagulation, platelet aggregation, vasoconstriction
b. Platelet aggregation, coagulation, vasoconstriction
c. Platelet aggregation, vasoconstriction, coagulation
d. Vasoconstriction, coagulation, platelet aggregation
e. Vasoconstriction, platelet aggregation, coagulation

Topic: Blood
Subtopic: Bleeding disorders
Difficulty level: Moderate
Cognitive level: C2
Reference: Guyton and Hall, 14th Edition. Chapter: 37. Page No. 485

29. To prevent excessive bleeding during surgery, a patient with haemophilia A may be given:

a. Fresh frozen plasma
b. Factor VIII concentrate
c. Factor IX concentrate
d. Factor X concentrate
e. Whole blood

Topic: Blood
Subtopic: Tissue transplant, graft-rejection
Difficulty level: Hard
Cognitive level: C2
Reference: Guyton and Hall, 14th Edition. Chapter: 36. Page No. 475-476

30. For hematopoietic stem cell transplants, MHC class I matching is needed to avoid the development of:

a. Antibody-medicated rejection
b. Cytotoxic T-cell rejection
c. Hyperacute rejection
d. Hypersensitivity reaction
e. Immune complex formation

Topic: Blood
Subtopic: Tissue transplant and graft rejection
Difficulty level: Moderate
Cognitive level: C2
Reference: Guyton and Hall, 14th Edition. Chapter: 36. Page No. 475

31. If a patient presents with severe combined immunodeficiency (SCID), the major complication with providing a bone marrow transplant to this patient would be:

a. Delayed onset anaphylaxis
b. Cardiovascular failure
c. Graft versus host disease
d. Respiratory failure
e. Acute renal failure

Topic: Blood
Subtopic: Platelet Disorders
Difficulty level: Hard
Cognitive level: C3

Reference: Guyton and Hall, 14th Edition. Chapter: 37. Page No. 485-486

32. A young patient is hospitalized with petechiae of oral mucous membrane, gingival haemorrhage having a platelet count of 45000/µl. The bleeding time (BT) and clot retraction time are increased, RBC and TLC are normal. He is suffering from:

a. Disseminated intravascular coagulation.
b. Immune thrombocytopenia
c. Non-thrombocytopenic purpura
d. Warfarin induced skin necrosis.
e. Thrombocytopenic Purpura

Topic: Blood
Subtopic: Blood Groups
Difficulty level: Moderate
Cognitive level: C2
Reference: Guyton and Hall, 14th Edition. Chapter: 36. Page No. 473-474

33. A mother having blood type B-ive who has always been perfectly healthy just delivered her first baby. The father is of blood group B+ive. Knowing that the first child is of blood group B+ive (B Rh+), what would you expect when she delivers the second baby?

a. The baby may have an ABO blood group incompatibility
b. The baby may develop both Rh and ABO incompatibility
c. The baby may develop hemolytic disease of the newborn
d. There will be no chance of developing haemolytic disease
e. The baby will have respiratory distress syndrome

Topic: Blood
Subtopic: Blood Proteins
Difficulty level: Easy
Cognitive level: C1
Reference: Guyton & Hall, Edition 14; Page no: 479, Chapter 37

34. Which plasma protein is responsible for blood coagulation?

a. Albumin
b. Antithrombin III
c. Erythropoietin
d. Fibrinogen
e. Globulin

Topic: Blood
Subtopic: RBCs
Difficulty level: Easy
Cognitive level: C1
Reference: Guyton & Hall, Edition 14; Page no: 447, Chapter 33

35. A native living at an altitude of 15000 feet above sea level has a red blood cell count of 6-7 million/cubic mm of blood. His condition is called:

a. Congenital polycythemia
b. Primary erythrocytosis
c. Primary polycythemia
d. Secondary polycythemia
e. Polycythemia vera

Topic: Blood
Subtopic: RBCs
Difficulty level: Hard
Cognitive level: C2
Reference: Guyton & Hall, Edition 14; Page no: 446, Chapter 33

36. A 17-year-old female presents to her family physician complaining of palpitations, generalized weakness, fatigue, cold extremities, and shortness of breath. Laboratory investigations reveal haemoglobin concentration of 8g/dl, MCV=75fl, MCH=26pg, MCHC=28g/dl. She is suffering from:

a. Hypochromic microcytic anemia
b. Hypochromic normocytic anemia
c. Normochromic macrocytic anemia

d. Normochromic microcytic anemia
e. Normochromic normocytic anemia

Topic: Blood
Subtopic: Inflammation
Difficulty level: Moderate
Cognitive level: C2
Reference: Guyton & Hall, Edition 14; Page no: 450-451, Chapter 34

37. Q17: A 10-year-old boy was brought to his family physician with complains of high grade fever, pain in throat, cough and severe body aches since last night. Doctor diagnosed him as a case of acute pharyngitis. Which of the following type of white blood cells are increased in this case?

a. Basophils
b. Eosinophils
c. lymphocytes
d. Macrophages
e. Neutrophils

Topic: Blood
Subtopic: WBCs
Difficulty level: Moderate
Cognitive level: 2
Reference: Guyton & Hall, Edition 14; Page no: 458, Chapter 34

38. A 13-year-old presents to the emergency room, with a 2-week history of diarrhoea and dehydration. His stool specimen is positive for parasitic eggs. Which type of WBCs would have an elevated number in blood?

a. Basophils
b. Eosinophils
c. Macrophages
d. Monocytes
e. Neutrophils

Topic: Blood
Subtopic: WBCs
Difficulty level: Hard
Cognitive level: C3
Reference: Guyton & Hall, Edition 14; Page no: 458, Chapter 34

39. A 5years old boy presented in OPD with 3 months history of bleeding gums, frequent infections, bone pain, pallor, and weight loss. On examination his cervical lymph nodes were swollen. CBC with complete peripheral film shows decrease in RBCs, platelets, increase in WBCs and presence of lymphoblasts. What is the most likely diagnosis?

a. Acute lymphocytic leukemia
b. Acute myelogenous leukemia
c. Aplastic anemia
d. Chronic lymphocytic leukemia
e. Chronic myelogenous leukemia

Topic: Blood
Subtopic: Immunity
Difficulty level: Hard
Cognitive level: C3
Reference: Guyton & Hall, Edition 14; Page no: 467, Chapter 35

40. A 35 years old male visits his family physician, complaining of fever, muscle pain, weakness, night sweats and history of weight loss for six months. Careful questioning reveals that he has past history of intravenous drug abuse. Laboratory tests reveal presence of anti-HIV antibodies in serum. Which of the following cells are affected in his case?

a. B-lymphocytes
b. Cytotoxic T cells
c. Helper T cells
d. Monocytes
e. Suppressor T cells

Topic: Blood
Subtopic: Allergy
Difficulty level: Moderate
Cognitive level: C3
Reference: Guyton & Hall, Edition 14; Page no: 469-470, Chapter 35

41. A 9-year-old female has nasal discharge and itching of eyes in the spring every year. An allergist performs a skin test using a mixture of grass pollens. Within a few minutes she develops a focal redness and a swelling at test site. The response is most likely due to:

a. Activation of B-lymphocytes
b. Activation of CD4 helper cells
c. Activation of cytotoxic T lymphocytes
d. Activation of neutrophils due to injected antigens
e. Antigen-antibody complexes of blood vessels

Topic: Blood
Subtopic: Allergy
Difficulty level: Moderate
Cognitive level: C2
Reference: Guyton & Hall, Edition 14; Page no: 469-470, Chapter 35

42. A 12-year-old schoolboy is brought to the emergency department of hospital with red blotches on skin. His mother reveals that he develops such rashes frequently in the spring. Which of the following antibodies is responsible for his condition?

a. IgA
b. IgD
c. IgE
d. IgG
e. IgM

BIOCHEMISTRY

Topic: Signal transduction
Subtopic: G-protein signaling
Difficulty level: Moderate
Cognitive level: C1
Reference: Harpers Illustrated Biochemistry By Peter J. Kennelly 32 edition pg 511

43. G-protein coupled receptors (GPCR) are bound to G-proteins on the cytoplasmic aspect of cell membrane. What binds with G protein after interaction with GPCR leading to dissociation of α subunit from βγ subunit?

a. ADP
b. ATP
c. cAMP
d. GDP
e. GTP

Topic: Subcellular organelles
Subtopic: Inherited disorders/ I-cell disease
Difficulty level: Hard
Cognitive level: C3
Reference: Lippincott's illustrated reviews Biochemistry 8th Edition Pg 169

44. A 4-year-old boy presents in the OPD. He has coarse facial features, skeletal abnormalities, and mental retardation. Hematological results show large amounts of lysosomal enzymes in blood and urine. Large inclusion bodies are also seen in the cells of these patients. The doctor tells his parents that the child is suffering from a genetic storage disorder due to which acid hydrolases are absent in his sub cellular organelle. What is the most likely diagnosis?

a. Hunter Syndrome
b. I-cell disease
c. Refsum disease
d. Parkinsonism
e. Progeria

Topic: Chemistry of purine and pyrimidines
Subtopic: Linkage of purine and pyrimidine in nucleic acid synthesis
Difficulty level: Easy
Cognitive level: C1
Reference: Lippincott's illustrated reviews Biochemistry 8th Edition Pg 413

45. DNA is made of two linked strands that wind around each other to resemble a twisted ladder. In a double stranded DNA molecule, the following base pair is seen.

a. Adenine and Cytosine
b. Adenine and thymine
c. Adenine and Uracil
d. Adenine and Guanine
e. Guanine and Uracil

Topic: DNA
Subtopic: Chargaff's rule
Difficulty level: Easy
Cognitive level: C2
Reference: Lippincott's illustrated reviews Biochemistry 8th Edition Pg 413

46. If a section of DNA has 13% thymine, then how much adenine is there?

a. 13%
b. 26%
c. 37%
d. 74%
e. 87%

Topic: RNA
Subtopic: RNA
Difficulty level: Easy
Cognitive level: C2
Reference: Lippincott's illustrated reviews Biochemistry 8th Edition Pg 435

47. The sequence of the template DNA strand is 5'-GATATCCATTAGTGAC-3'. What is the sequence of the RNA produced?

a. 5'-CAGUGAUUACCUAUAG-3'
b. 5'-CTATAGGTAATCUUCTG-3'
c. 5'-CUAUAGGUAAUCACUG-3'
d. 5'-GTCACTAATGGATTATC-3'
e. 5'-GUCACUAAUGGAUAUC-3'

Topic: Nucleotides
Subtopic: Role of synthetic analogues in medicine
Difficulty level: Hard
Cognitive level: C2
Reference: Lippincott's Illustrated reviews Biochemistry 8th Edition Pg 304

48. A 62-year-old man has been experiencing abdominal pain, constipation, and rectal bleed for the last 7 months. He visits his GP and is diagnosed with colorectal carcinoma. The GP prescribed him 5-flurouracil along with other chemotherapeutic agents to help shrink the tumor and prevent it from spreading. 5-flurouracil interferes with the incorporation of the following base into DNA:

a. Adenine
b. Cytosine
c. Guanine
d. Thymine
e. Uracil

Topic: Chromosomes
Subtopic: Higher organization of DNA
Difficulty level: Easy
Cognitive level: C2
Reference: Harpers Illustrated Biochemistry By Peter J. Kennelly 32 edition pg 363

49. When the cell is entering into division phase, the chromatin material of the eukaryotic cell becomes highly condensed, is gene-poor, and transcriptionally silent. Which of the following proteins is closely associated with the structure of condensed chromatin and provides support to it leading to its compaction?

a. Cohesins
b. Condensin
c. Histones
d. SMC proteins
e. Topoisomerases

Topic: Nucleotide Metabolism
Subtopic: Interpretation of Lesch-Nyhan Syndrome on a given data
Difficulty level: Hard
Cognitive level: C2
Reference: Lippincott's Illustrated reviews Biochemistry 8th Edition Pg 296

50. A patient presents in OPD with painful joints and history of kidney stones. There is also a history of biting of lips and fingers. His serum uric acid levels are high. The doctor explains to his attendant that he is suffering from a rare X-linked disease that causes complete deficiency of hypoxanthine-guanine phosphoribosyltransferase (HGPRT) leading to hyperuricemia. What is the most likely diagnosis?

a. Adrenoleukodystrophy
b. Fabry Disease
c. Kabuki syndrome
d. Lesch Nyhan Syndrome
e. Rickets

Topic: Replication
Subtopic: Prokaryotic DNA replication
Difficulty level: Moderate
Cognitive level: C2
Reference: Lippincott's Illustrated reviews Biochemistry 8h Edition Pg 435

51. In a cell, DNA replication starts from a single unique sequence and continues along two replication forks moving away from the origin in opposite directions. What type of cell will this kind of DNA replication be taking place in?

a. Algae
b. Bacteria
c. Fungus
d. Hepatocyte
e. Myocyte

Topic: Replication
Subtopic: DNA replication
Difficulty level: Moderate
Cognitive level: C3
Reference: Harpers Illustrated Biochemistry By Peter J. Kennelly 32 edition pg 373

52. A DNA molecule in which both strands have radioactive thymidine is permitted to replicate in an environment that contains non-radioactive thymidine. What is the right number of DNA molecules which possess some radioactive thymidine post three duplications?

a. four such molecules
b. eight such molecules
c. one such molecule
d. ten such molecules
e. two such molecules

Topic: DNA repair
Subtopic: Xeroderma pigmentosum
Difficulty level: Moderate
Cognitive level: C2
Reference: Harpers Illustrated Biochemistry By Peter J. Kennelly 32 edition pg 412

53. DNA analysis of a 17-year-old boy showed accumulation of thymine dimers. He had a history of sensitivity to sunlight and was diagnosed with skin cancer. What defect in repair of DNA is seen in such patients?

a. Base excision repair
b. Double strand break repair
c. Mismatch repair
d. Nucleotide excision repair
e. Transcription coupled repair

Topic: Transcription
Subtopic: Prokaryotic transcription
Difficulty level: Moderate
Cognitive level: C1
Reference: Lippincott's illustrated reviews Biochemistry 8th Edition Pg 436

54. The consensus sequence on the DNA that is recognized by the sigma subunit of the prokaryotic RNA polymerase is:

a. 5'-TAATAT-3'
b. 5'-TATAAA-3'
c. 5'-TATAAT-3'
d. 5'-TTGAAC-3'
e. 5'-TTGACA-3'

Topic: Translation
Subtopic: Post-translational modification
Difficulty level: Easy
Cognitive level: C1
Reference: Lippincott's illustrated reviews Biochemistry 8th Edition Pg 461

55. mRNA is translated and proteins are synthesized in the cell cytoplasm. After synthesis some proteins undergo addition of monosaccharides to their structures. In which part of the cell does this process take place?

a. Centrioles
b. Golgi apparatus
c. Lysosomes
d. Mitochondria
e. Ribosomes

Topic: Translation
Subtopic: Inhibition of translation by drugs
Difficulty level: Moderate
Cognitive level: C2
Reference: Lippincott's illustrated reviews Biochemistry 8th Edition Pg 457

56. Mrs. ABC is a 55-year-old woman, experiencing symptoms of a respiratory infection for several days, including coughing, wheezing and shortness of breath. After physical examination and laboratory tests, she is diagnosed with community acquired pneumonia. The doctor prescribes her erythromycin. How does erythromycin act to inhibit the spread of bacteria?

a. Bears a structural resemblance to aminoacyl-tRNA and accepts peptide from the P site.
b. inds irreversably to a site on the 50s subunit and inhibits translocation.
c. Binds to the 30s subunit and distorts its structure.
d. Interacts with the 30s subunit, blocking access of the aminoacyl-tRNA 1o the A site.
e. Inhibits prokaryotic peptidyltransferase.

Topic: Hemoglobin and its types/RBCs
Subtopic: Hemoglobin
Difficulty level: Moderate
Cognitive level: C1
Reference: Lippincott's illustrated reviews Biochemistry 7th Edition Pg 227

57. In biosynthesis of heme condensation between succinyl co A and glycine requires as a coenzyme;

a. Biotin
b. Flavin adenine dinucleotide
c. Flavin mononucleotide
d. Nicotinamide adenine dinucleotide
e. Pyridoxal phosphate

Topic: Hemoglobin and its types/RBCs
Subtopic: Hemoglobin
Difficulty level: Moderate
Cognitive level: C2
Reference: Lippincott's illustrated reviews Biochemistry 8th Edition Pg 25

58. The ability of hemoglobin to serve as effective transporter of oxygen and carbon dioxide between lungs and tissues is explained by which of the following.

a. The isolated heme group with ferrous iron binds oxygen more avidly than carbon dioxide
b. The alpha and beta chains of hemoglobin have very different structure from that of myoglobin
c. Hemoglobin utilizes oxidized ferric iron to bind oxygen in contrast to ferrous iron of myoglobin
d. Hemoglobin shows more changes in secondary and tertiary structure after binding to oxygen
e. Hemoglobin binds proportionately more oxygen at low oxygen tension than does myoglobin

Topic: Hemoglobinopathies/RBCs/Homeostasis
Subtopic: RBCs
Difficulty level: Hard
Cognitive level: C3
Reference: Lippincott's illustrated reviews Biochemistry 8th Edition Pg 378

59. A 2-year-old boy of normal weight and height is brought to a clinic because of excessive fatigue. Blood work indicates anemia, with microcytic hypochromic red cells. The boy lives in a 100-year-old apartment building and has been caught ingesting paint chips. His parents indicate that the child eats a healthy diet and takes a vitamin supplement every day. His anemia is most likely attributable to a deficiency in which of the following?

a. Iron
b. B12
c. Folate
d. Heme
e. B6

Topic: Iron metabolism/RBCs
Subtopic: Iron metabolism
Difficulty level: Moderate
Cognitive level: C2
Reference: Lippincott's illustrated reviews Biochemistry 8th Edition Pg 378

60. A 26-years-old female discussed family planning with her doctor. She is interested in starting a family soon and is looking for advice that what nutritional supply would be beneficial in pregnancy. The doctor suggests which of the following supplements as being most important for health of the fetus.

a. Iron & vitamin K
b. Iron and riboflavin
c. Vitamin A & folic acid
d. Iron and folic acid
e. Vitamin C & vitamin D

Topic: Iron metabolism/RBCs
Subtopic: Iron metabolism
Difficulty level: Moderate
Cognitive level: C2
Reference: Lippincott's illustrated reviews Biochemistry 8th Edition Pg 404

61. Hemochromatosis is a genetic disorder of iron overload which is secondary to the decrease in the expression of hepcidin because of a mutation in gene leading to inability to release excess iron into the circulation. Normally when iron is in excess, hepcidin;

a. Increase the formation of ferritin

b. Inactivates ferroprotein.
c. Prevents the reduction of Fe3 to Fe2
d. Transport the iron across the cell membrane
e. Catalyzes the oxidation of Fe2 to Fe3

Topic: Heme degradation/RBCs
Subtopic: Heme degradation/RBCs
Difficulty level: Easy
Cognitive level: C1
Reference: Harpers Illustrated Biochemistry By Peter J. Kennelly 32 edition pg 330

62. The catabolism of hemoglobin

a. Occurs in erythrocytes
b. Occurs in myocytes
c. Occurs in hepatocytes
d. Occurs in neutrophils
e. Occurs in renal cells

Topic: Hyperbilirubinemias/RBCs/Blood group
Subtopic: Hyperbilirubinemias
Difficulty level: Hard
Cognitive level: C3
Reference: Lippincott's illustrated reviews Biochemistry 8th Edition Pg 285

63. A newborn, premature child has developed severe discoloration of skin, decreased muscle tone and twitching movements of the limbs. His laboratory investigation shows total bilirubin of 32 mg/dl. Phototherapy and exchange blood transfusion were advised. This condition occurred because of:

a. Crossing of blood brain barrier by hydrophobic unconjugated bilirubin
b. Crossing of blood brain barrier by hydrophilic conjugated bilirubin
c. Failure of liver to uptake bilirubin
d. Failure of enzymatic conversion of biliverdin to bilirubin
e. Deficiency of heme oxygenase enzyme

Topic: Genetics
Subtopic: Sickle cell anemia
Difficulty level: Hard
Cognitive level: C2
Reference: Lippincott's illustrated reviews Biochemistry 8th Edition Pg 36

64. The substitution of valine for glutamate at position 6 of two beta chains of sickle cell hemoglobin causes which of the following:

a. Decrease polymerization of deoxyhemoglobin
b. Increased electrophoretic mobility at Ph 7
c. Increased solubility of deoxyhemoglobin
d. More flexible red blood cells
e. Unchanged primary structure

COMMUNITY MEDICINE & PUBLIC HEALTH

Topic: Changing Concept of health and diseases
Subtopic: Theories of disease causation
Difficulty level: Moderate
Cognitive level: C2
Reference: PSM K Park 24th ed Page 8-9

65. In 4th Century BCE the scholars believe that the health was determined by the humoral factors. The disequilibrium of the humoral factor leads to disease. This concept of disease causation falls under which of the following theory?

a. Personnel theory
b. Naturalistic theory
c. Biomedical concept

d. Multifactorial theory
e. Spiritual theory

Topic: Health & Disease
Subtopic: Determinants of Disease
Difficulty level: Moderate
Cognitive level: C2
Reference: PSM K Park 24th ed Page 24-26

66. Which one of the following health indicators depicts all dimensions of health?

a. Life expectancy at birth
b. Mortality rates
c. Morbidity rates
d. Human Development Index
e. Premature deaths

Topic: Prevention and control of diseases
Subtopic: Levels of Prevention
Difficulty level: Moderate
Cognitive level: C1
Reference: Reference: PSM K Park 24th ed Page 46

67. The Intervention for restoration of heath in early pathogenic phase falls under which type of Prevention.

a. Primordial Prevention
b. Health Promotion
c. Specific Protection
d. Primary Prevention
e. Secondary Prevention

Topic: Genetics counseling of Parents
Subtopic: Early Diagnosis
Difficulty level: Moderate
Cognitive level: C2
Reference: Community Medicine & Public Health 8th Page 338-339

68. Carrier gene frequency of Thalassemia is very high in our community. For prevention of this, at which state, the genetic counseling will be most beneficial?

a. Married couples
b. Pre-conceptual,
c. Post-conceptual
d. Neo-natal
e. Pre-marital

Topic: Nutritional Anemia
Subtopic: Iron deficiency Anemia
Difficulty level: Hard
Cognitive level: C2
Reference: PSM K Park 24th ed Page 660

69. The most effective strategy for prevention of iron deficiency anemia for scattered, remote and marginalized population:

a. Health education
b. Food supplements
c. Food fortification
d. Interpersonal communication
e. Iron supplements

BEHAVIORAL SCIENCES

Topic: Psychological counseling of patients and their families
Subtopic: Counseling
Difficulty level: Easy
Cognitive level: C1
Reference: page 14, HANDBOOK OF BEHAVIOURAL SCIENCES 3RD EDITION

70. A worried mother comes to you for counseling as her 8-year-old child has bed wetting problem. She has her own idea about counseling. While clearing her concepts about counseling which of the following would be most INAPPROPRIATE?

a. Counseling is about helping patients, help themselves
b. A straight advice is given to make people feel and function better
c. During counseling session invalidating patient's feeling is discouraged
d. There is no comparison between counselor and patient's experiences
e. There is no intent of making people less emotional after the session

Topic: Biological Basis of Behaviour
Subtopic: Anatomy of Memory
Difficulty level: Moderate
Cognitive level: C2
Reference: page 77, HANDBOOK OF BEHAVIOURAL SCIENCES 3RD EDITION

71. A 70-year-old man is facing difficulty in remembering new things, which of the brain areas are involved in it?

a. Hippocampus and amygdala
b. Singulate gyrus
c. Frontal lobe
d. Occipital lobe
e. Parietal lobe

Topic: Psychology and Disease
Subtopic: Role of psychological factors in precipitation of illness
Difficulty level: Moderate
Cognitive level: C2
Reference: page 63, HANDBOOK OF BEHAVIOURAL SCIENCES 3RD EDITION

72. Physiological processes in human are directly affected by psychological stress which includes?

a. Immune system
b. Personality issues
c. Belief system
d. Doctor patient relationship
e. Psychosocial development

Topic: Behavioural factors & Pharmacological Treatment
Subtopic: Health belief model
Difficulty level: Easy
Cognitive level: C1
Reference: page 138-139, HANDBOOK OF BEHAVIOURAL SCIENCES 3RD EDITION

73. Health belief model is about:

a. Dealing with biological factors of disease
b. Just dealing with psychological factors of disease
c. Cultural understanding of disease and ownership of health care plan
d. Not giving value to patient's cultural background
e. Imposing health care plan to which patient does not agree

Topic: Stress
Subtopic: Physiological effects of stress
Difficulty level: Easy
Cognitive level: C1
Reference: page 223, HANDBOOK OF BEHAVIOURAL SCIENCES 3RD EDITION

74. Which of the following is symptom of stress related to central nervous system?

a. Peptic ulcer
b. Asthma
c. Amenorrhea
d. Abdominal pain
e. Tension headache

PATHOLOGY

Topic: Cell injury
Subtopic: Calcification
Difficulty level: Moderate
Cognitive level: C2
Reference: Robbins PATHOLOGY, page 65, Chapter2

75. A 45-year-old patient presented with ovarian carcinoma. His histopathology report revealed that epithelial tumor has laminated calcified bodies (psamoma bodies). What type of cellular change is this?

a. Dystrophic calcification
b. Metastatic calcification
c. Hypertrophy
d. Hyperplasia
e. Metaplasia

Topic: Sterilization & disinfection
Subtopic: Chemical disinfectants
Difficulty level: Moderate
Cognitive level: C2
Reference: page 101, chapter 13, sterilization n& disinfection, Levinson 13th ed

76. Laboratory technician was asked to sterilize endoscope for use in Gastric clinic. The best chemical agent for this purpose is

a. Hydrogen peroxide
b. Formaldehyde
c. Glutaraldehyde
d. Chlorhexidine
e. Iodine

Topic: Cell injury
Subtopic: Apoptosis
Difficulty level: Moderate
Cognitive level: C2
Reference: page 57-8, Chapter2, Robbins

77. Chemotherapeutic agent is used to treat malignant epithelial tumor. After chemotherapy, there is reduction in tumor size. Which mechanism is responsible for reduction of tumor?

a. Apoptosis
b. Atrophy
c. Pigmentation
d. Calcification
e. Necrosis

Topic: Introduction to microorganisms
Subtopic: Cell wall of gram positive and gram-negative bacteria
Difficulty level: Moderate
Cognitive level: C2
Reference: Reference: page 4-12, chapter 2, Levinson 13th ed

78. Which of the following is the major structural difference between gram negative and gram-positive cell wall?

a. Gram negative bacteria have thin peptidoglycan layer whereas gram positive have thick layer
b. Gram negative bacteria carries plasmids whereas gram positive bacteria do not.
c. Gram negative bacteria have capsule whereas gram positive bacteria do not.
d. Gram negative bacteria have techoic acid whereas gram positive bacteria do not.
e. Gram negative bacteria are spore forming whereas gram positive bacteria do not.

Topic: Introduction to microorganisms
Subtopic: Growth curve
Difficulty level: Easy
Cognitive level: C1
Reference: page 15, chapter3, Levinson 13 ed

79. In which one of the bacterial growth curve phases, penicillin is most effective?

a. Lag phase
b. Log phase
c. Stationary phase
d. Decline phase
e. Death phase

Topic: Blood cells, platelets and blood group
Subtopic: Anemia
Difficulty level: Moderate
Cognitive level: C2
Reference: page 649, chapter14, Robins

80. A 23-year-old pale looking pregnant lady presented in gynecological OPD with complaints of breathlessness and easy fatigue with no previous history of any chronic illness. The peripheral blood picture revealed microcytic hypochromic RBCs with normal WBC and Platelet count. What is the most likely diagnosis?

a. Iron deficiency anemia
b. Megaloblastic anemia
c. Sickle cell anemia
d. Anemia of chronic disease
e. Aplastic anemia

PHARMACOLOGY

Topic: General Pharmacology
Subtopic: Pharmacodynamics
Difficulty level: Easy
Cognitive level: C1
Reference: Katzung & Trevor's Pharmacology edition 11; Page no 1

81. Which of the following denotes the actions of the drug on the body, such as mechanism of action, therapeutic and toxic effects?

a. Absorption
b. Metabolism
c. Pharmacology
d. Pharmacokinetics
e. Pharmacodynamics

Topic: General Pharmacology
Subtopic: Pharmacokinetics
Difficulty level: Easy
Cognitive level: C1
Reference: Katzung & Trevor's Pharmacology edition 12; Page no 26

82. Bioavailability of a drug is defined as:

a. Time required by a drug to reduce to 50% of its previous plasma concentration.
b. Total amount of the drug in the body to its plasma concentration

c. Fraction of the drug that reaches the systemic circulation in unchanged form
d. The maximum and minimum drug concentrations achieved during repeated dosing cycles
e. The ratio of the rate of elimination of a drug to the concentration of the drug in the plasma

Topic: General Pharmacology
Subtopic: Pharmacodynamics
Difficulty level: Hard
Cognitive level: C1
Reference: Katzung Basic and clinical Pharmacology edition 12; Page no 23

83. Trans-membrane receptors after activation by an appropriate ligand activate separate cytoplasmic tyrosine kinase molecules (JAKs). Which of the following drug acts by phosphorylating STAT molecules and lead to regulate transcription?

a. Insulin
b. Corticosteroids
c. Vitamin D
d. Acetylcholine
e. Cytokines

Topic: Autonomic nervous system
Subtopic: Sympathetic nervous system
Difficulty level: Easy
Cognitive level: C1
Reference: Katzung Basic and clinical Pharmacology edition 12; Page no 52

84. Beta-2 receptors are located at:

a. Cardiac muscle
b. Juxtaglomerular apparatus
c. Adipose tissue
d. Smooth muscle, liver and heart
e. Effector tissues

Topic: Hematopoietic system
Subtopic: Anemia
Difficulty level: Easy
Cognitive level: C1
Reference: Katzung Basic and clinical Pharmacology edition 12; Page no 280

85. If a woman has macrocytic anemia, an increased serum concentration of transferrin, and a normal serum concentration of vitamin B12, the most likely cause of her anemia is deficiency of which of the following?

a. Cobalamin
b. Erythropoietin
c. Folic acid
d. Intrinsic factor
e. Iron

MBBS 1ST PROFESSIONAL
MODULAR INTEGRATED 2K23
(Short Essay Questions)

Max. Marks: **35**
Time Allowed: **70 MINUTES**

	ANATOMY	
	Topic: Gross Anatomy & Special Histology Subtopic: Spleen Cognitive Level: C3 Difficulty Level: Moderate Reference: Medical Histology text & Atlas by Laiq Hussain- 8th Edition. Chapter 15: Immune system and lymphoid organs- Page no: 145-146	
1.	**Q1: A 24-year-old male is brought to emergency in an unconscious state after a road traffic accident. On examination, the doctor noticed multiple bruises on his abdomen. On ultrasonography, it was confirmed that the hematopoietic organ lying in left hypochondrium just beneath the 9th,10th and 11th rib was injured. Using your anatomical knowledge, name the organ involved and briefly explain its blood supply and also differentiate between red and white pulp.** **KEY:** Spleen is injured. (0.25) The splenic artery enters the spleen through the hilum and divides into branches as trabecular arteries. They branch & form central arterioles. Each central artery is surrounded by a periarterial lymphatic sheath. Central arteries become reduced in size, lose the investment of white pulp, enter the red pulp, and divide into straight arterioles, called penicillar arterioles. The penicillar arterioles divide and give rise to arterial capillaries, which convey the blood to the splenic sinusoids. (0.75) Two types of circulation are in spleen. (i) open circulation - According to the open circulation model, the terminal arterial capillaries release their blood into the splenic cords from where the blood slowly percolates into the sinusoids (ii) closed circulation- According to the closed circulation model, the terminal arterial capillaries are connected to the splenic sinusoids and deliver the blood directly into these sinusoids. (1) **THE RED PULP:** The red pulp appears reddish in color in the fresh state as well as in routine histological sections because it contains huge numbers of erythrocytes. The microscopic examination of the red pulp reveals that it consists of cellular cords called splenic cords, which are separated from each other by sinusoidal capillaries which are called splenic sinusoids. The splenic cords contain cells of many different kinds including erythrocytes, T lymphocytes, B lymphocytes, plasma cells, granular leukocytes, platelets, macrophages, and dendritic cells. All these cells are supported by a fine meshwork of reticular fibers and reticular cells. The splenic sinusoids (also called splenic sinuses) are wide sinusoidal capillaries which lie between the splenic cords. (1.5) **THE WHITE PULP:** This part of splenic pulp consists of typical lymphoid tissue that surrounds and follows branches of the splenic artery. This lymphoid tissue forms a cylindrical periarterial lymphatic sheath (PALS) around each branch of the splenic artery. The periarterial lymphatic sheath is composed chiefly of T lymphocytes. At places, enclosed within the PALS are lymphoid nodules, called splenic nodules, which appear as ovoid masses. These nodules are composed chiefly of B lymphocytes and most of them are secondary lymphatic nodules exhibiting germinal centers. (1.5)	2+3

2.	Topic: General Embryology Subtopic: Placenta Cognitive Level: C3 Difficulty Level: Moderate Reference: Book: Langman's Medical Embryology, 14th Edition, Chapter 6: 3rd month to Birth: The Fetus and Placenta, Page no: 119, 113, 114, 116	
	Q2: A 34-year-old pregnant woman G2 P1(gravida2, Para1), presents at 32 weeks of gestation presents in Antenatal OPD with complaints of increasing abdominal discomfort and difficulty in breathing. On examination, her fundal height is larger than expected for the gestational age and ultrasound reveals an amniotic fluid index (AFI) of 28cm. What is the most probable diagnosis and give its causes? Describe the blood circulation of placenta? **KEY**: Polyhydramnios. (1) Causes of Polyhydramnios: (i) Fetal causes; GIT: Esophageal/duodenal atresia, tracheoesophageal fistula, CNS: Anencephaly (decreased swallowing, exposed meninges, no antidiuretic hormone, (ii) Twin-twin transfusion (iii) Hydrops fetalis (iv) Maternal causes; Diabetes Mellitus, (iv) Idiopathic (2) Circulation of the Placenta: Cotyledons receive their blood through 80 to 100 spiral arteries that pierce the decidual plate and enter the intervillous spaces at more or less regular intervals. Pressure in these arteries forces the blood deep into the intervillous spaces and bathes the numerous small villi of the villous tree in oxygenated blood. Blood from the intervillous lakes drains back into the maternal circulation through the endometrial veins. Collectively, the intervillous spaces of a mature placenta contain approximately 150 mL of blood, which is replenished about three or four times per minute. (2)	1+2+2
3.	**Topic**: General Anatomy & General Histology **Subtopic**: Muscles & Connective Tissue **Cognitive level**: C1 **Difficulty level**: Easy **Reference:** Book: General Anatomy by Laiq Hussain Siddique, Edition: 3rd Edition, Chapter 5: Muscles, Page 74, Book: Medical Histology by Laiq Hussain Siddique, Edition: 8th Edition, Chapter 6, Connective Tissue Proper, Page 57	
	Q3: A footballer had an accident during a match, he got muscle injury, recalling your knowledge of anatomy classify muscles on basis of their fibers parallel to line of pull with example of each subgroup also explain the type of connective tissue associated with muscles. **KEY:** These muscles have great range of movement but comparatively less power. They are further classified into three subgroups: (a) strap like muscles, (b) quadrilateral muscles, and (c) fusiform muscles. (a) Strap-Like Muscles. The length of these muscles is much greater than their width, giving them a strap-like appearance. In most of such muscles the muscle fibers run for the entire length of the muscle e.g., the sartorius muscle of thigh and infrahyoid muscles of neck (sternohyoid and sternothyroid, etc.). However, the muscle fibers may run over shorter segments because there are transverse tendinous intersections at intervals e.g., the rectus abdominis muscle of the anterior abdominal wall. (1) (b) Quadrilateral Muscles. In these parallel-fibred muscles the length is short, giving the muscle a flat, quadrilateral appearance e.g., the thyrohyoid muscle of the larynx. (1) (e) Fusiform Muscles. In a fusiform muscle the fibers are arranged nearly parallel to each other in the belly region but converge toward the proximal and distal attachments, so that the muscle tapers at boll ends and, hence, appears fusiform e g. the biceps brachii. (1) Dense regular connective tissue is a type of connective tissue that is associated with muscles. This tissue is composed of densely packed bundles of collagen fibers. The limited space between the fiber bundles is occupied by the ground substance and fibroblasts. The dense regular connective tissue occurs in the form of cordlike or band-like structures (tendons and ligaments) or broad sheet-like	3+2

	structures (aponeuroses). (1) Tendons and Ligaments: Tendons are cord-like structures which attach muscles to the bones whereas ligaments are band like structures that join bones to bones. They are composed almost entirely of collagen fibers. (0.5) Aponeuroses: These structures are actually broad, flattened tendons that attach sheet-like muscles to the bones. In an aponeurosis, the collagen fibers are usually arranged in multiple layers. (0.5)	

	PHYSIOLOGY	
	Topic: Blood Subtopic: Anaemia Difficulty level: Moderate Cognitive level: C2 Reference: Guyton, 14th edition page 446	
1.	**Q.1. A 30-year-old woman presented in medical OPD with the complaints of heavy menstrual bleeding. On examination, she has pallor and spoon shaped nails. Her investigations show a mean corpuscular volume of 70 fl and a haemoglobin level of 9 mg/dl. Identify the condition that she is suffering from? Explain the pathophysiology of the given condition?** Key: Microcytic hypochromic anaemia (1) The patient has heavy menstrual bleeding leading to blood loss. (1) After haemorrhage, the body replaces the fluid portion of the plasma in 1 to 3 days, but results in a low concentration of RBCs. If a second haemorrhage does not occur, RBC concentration usually returns to normal within 3 to 6 weeks. (1) When chronic blood loss occurs, a person frequently cannot absorb enough iron from the intestines to form haemoglobin as rapidly as it is lost. (1) RBCs that are much smaller than normal and have too little haemoglobin inside them are then produced, giving rise to microcytic, hypochromic anaemia. (1)	1+4
2.	Topic: Autonomic Nervous System (ANS) Subtopic: Parasympathetic Nervous System Difficulty level: Difficult Cognitive level: C3 Reference: Guyton and Hall, 14th Edition, Unit XI, Table-6-11 Autonomic Effects on various organs of the body	
	Q.2. A 36-year-old male patient comes to the emergency with the history of severe neck trauma. He complains of a variety of symptoms including hoarseness, tachycardia/irregular heartbeat, problems with digestion, and constipation. What division of the nervous system in this patient has been damaged? What are the major effects produced on different organs by the division of the nervous system that was damaged in this patient? Key: Parasympathetic division of the autonomic nervous system. 1+4 Parasympathetic nervous system can have the following effects: **<u>Effects</u>** Eyes: constriction of pupils. Oral Cavity: Salivation. Heart: can Slow or even Block Cardiac Rhythm and Conduction "Ventricular Escape." Lungs: The parasympathetic nerves provide the dominant autonomic control of airway smooth muscle. They release acetylcholine onto muscarinic receptors, causing contraction and bronchoconstriction.	1+4

	GIT: exerts both excitatory and inhibitory control over gastric and intestinal tone and motility (i.e., milling, absorption, secretion, and defecation) (Rest and digest) Gall Bladder: Contraction of the muscle wall in the gallbladder is stimulated by the vagus nerve of the parasympathetic system. releases bile. Urinary Bladder: Parasympathetic postganglionic nerve terminals release acetylcholine (ACh), which can excite various muscarinic receptors in bladder smooth muscles, leading to bladder contractions.	

	BIOCHEMISTRY	
	Topic: RNA & Transcription (FB-007 & FB-013) Subtopic: RNA, its types, and post transcriptional modifications Cognition level: C1 Difficulty index: Moderate Reference: Illustrated Reviews Biochemistry 8th Edition pg 433-434, 441	
1.	**Q1 Define RNA? Give the function of the three main types of RNA. Describe the post transcriptional modification of eukaryotic mRNA.** **KEY:** **Definition:** **(0.5 mark)** The genetic master plan of an organism is contained in the sequence of deoxyribonucleotides in its DNA. However, it is through ribonucleic acid, the "working copies" of DNA, that the master plan is expressed. The copying process, during which a DNA strand serves as a template for the synthesis of RNA, is called transcription. Transcription produces messenger RNA, which are translated into sequences of amino acids, and ribosomal RNA (rRNA), transfer RNA (tRNA), and additional RNA molecules that perform specialized structural, catalytic, and regulatory functions and are not translated. **Function of 3 types** **(0.5 + 0.5 + 0.5 mark)** Ribosomal RNA rRNA are found in association with several proteins as components of the ribosomes, the complex structures that serve as the sites for protein synthesis. Prokaryotic cells contain three distinct size species of rRNA (238, 168, and SS, where S is the Svedberg unit for sedimentation rate that is determined by the size and shape of the particle). Eukaryotic cells contain four rRNA species (28S, 18S, 5.8S, and SS). Together, rRNA make up 80% of the total RNA in the cell. Transfer RNA tRNA are the smallest (4S) of the three major types of RNA molecules. There is at least one specific type of tRNA molecule for each of the 20 amino acids commonly found in proteins. Each tRNA serves as an adaptor molecule that carries its specific amino acid, covalently attached to its 3'-end, to the site of protein synthesis. There, it recognizes the genetic code sequence on an mRNA, which specifies the addition of that amino acid to the growing peptide chain. Messenger RNA mRNA comprises only 5% of the RNA in a cell but is by far the most heterogeneous type of RNA in size and base sequence. mRNA is coding RNA that carries genetic information from DNA for use in protein synthesis. In eukaryotes, this involves transport of mRNA out of the nucleus and into the cytosol. An mRNA carrying information from more than one gene is polycistronic (cistron=gene). Polycistronic mRNA is characteristic of prokaryotes. An mRNA carrying information from only one gene is monocistronic and is characteristic of eukaryotes. **Post translational modification:** **(1+1+1 mark)** The pre-mRNA components of hnRNA undergo extensive co- and posttranscriptional modification in the nucleus and become mature mRNA. These modifications usually include the following. **a) Addition of a 5'-cap:** This is the first of the processing reactions for pre-mRNA. The cap is a 7-methylguanosine attached to the 5'-terminal end of the mRNA through an unusual 5'-5'-triphosphate linkage. Creation of the cap requires removal of the γ phosphoryl group from the 5'-triphosphate of the pre-mRNA,	(0.5 + 1.5 + 3)

	followed by addition of guanosine monophosphate by the guanylyltransterase. Methylation of this terminal guanine occurs in the cytosol and is catalyzed by guanine-7-meth-yltransferase. S-Adenosyl methionine is the source of the methyl group. **b) Addition of a 3'-poly·A tail:** Most eukaryotic mRNA have a chain of 40-250 adenylates attached to the 3'-end. This poly-A tail is not transcribed from the DNA but rather is added by polyadenylate polymerase, using ATP as the substrate. The pre-mRNA is cleaved downstream of a consensus sequence, called the polyadenylation signal sequence (AAUAAA), found near the 3' -end of the RNA, and the poly-A tail is added to the new 3'-end. Tailing terminates eukaryotic transcription. **c)Splicing**: Maturation of eukaryotic mRNA usually involves removal from the primary transcript of RNA sequences that do not code for protein. The exons are joined together to form the mature mRNA. The process of removing introns and joining exons is called splicing. Mechanism of splicing: The binding of snRNP brings the sequences of neighbouring exons into the correct alignment for splicing, allowing two transesterification reactions to occur. The 2'-0H group of an adenine nucleotide (known as the branch site A) in the intron attacks the phosphate at the 5'-end of the intron, forming an unusual 2' ⟶ 5'-phosphodiester bond and creating a "lariat" structure. The newly freed 3'-0H of exon 1 attacks the 5'-phosphate at the splice-acceptor site, forming a phosphodiester bond that joins exons 1 and 2. The excised intron is released as a lariat, which is typically degraded but may be a precursor for ncRNA such as snoRNA. Alternative splicing: The pre-mRNA molecules from >90% of human genes can be spliced in alternative ways in different tissues to produce multiple variations of the mRNA and its protein product. It is a mechanism for producing a large, diverse set of proteins from a limited set of genes. For example, the mRNA for tropomyosin undergoes extensive tissue-specific alternative splicing with production of multiple isoforms of the TM protein.	
2.	Topic: Hyperbilirubinemias / RBCs/ Blood Groups (HL-B 005) Subtopic: Hyperbilirubinemias Cognition level: C3 Difficulty index: Moderate Reference: Illustrated Reviews Biochemistry 8th Edition pg 284, 175	
	Q-2 A 45-year-old male was presented to the emergency department. He had severe pain in right upper quadrant of the abdomen along with fever and vomiting. His laboratory investigations revealed raised bilirubin level. His ultrasonography showed multiple stones in gall bladder and one stone impacted in common bile duct. What is the type of bilirubin raised in this patient? Justify your answer. How will the impact of common bile duct effect the digestion of fat in the intestine? **KEY** **Type of hyperbilirubinemia** **(1 mark)** Conjugated bilirubin **Justification:** **(2 marks)** The presence of a tumor or bile stones may block the duct, preventing passage of conjugated bilirubin into the intestine. Patients with obstructive jaundice experience GI pain and nausea and produce stools that are a pale, clay color. The conjugated bilirubin regurgitates into the blood causing conjugated hyperbilirubinemia. **Effect on fat digestion:** **(2 marks)** Detergent properties of bile salts are needed for the emulsification of duodenal lipids and stabilization of lipid droplets as they become smaller from peristalsis and prevent them from coalescing. This increases the surface area for the digestive enzymes to act upon. Since bile is absent the emulsification of fat is not possible, and digestion of fats is impaired leading to loss of fats in the feces.	1+2+2

	Topic: Hemoglobin & Myoglobin Subtopic: HEMOGLOBINOPATHIES, HEME AND ANEMIAS Difficulty Level: MODERATE Cognitive level: C2	
3.	**Sickle cell anemia is characterized by lifelong episodes of pain ("crises") and chronic hemolytic anemia with associated hyperbilirubinemia. What is the pattern of inheritance of sickle cell disease? Give the biochemical cause of crises, hemolytic anemia and hyperbilirubinemia in these patients.** **Key:** Sickle cell disease is an autosomal recessive disorder. It occurs in individuals who have inherited two mutant genes (one from each parent) that code for synthesis of the β chains of the globin molecules If both parents have Sickle Cell Trait (SCT), there is a 50% (or 1 in 2) chance that any child of theirs also will have SCT, if the child inherits the sickle cell gene from one of the parents. Such children will not have symptoms of SCD, but they can pass SCT on to their children. The replacement of the charged glutamate with the nonpolar valine forms a protrusion on the β chain that fits into a complementary site on the β chain of another hemoglobin molecule in the cell. At low oxygen tension, deoxyhemoglobin S polymerizes inside the RBC, forming a network of insoluble fibrous polymers that stiffen and distort the cell, producing rigid, misshapen RBC. Such sickled cells frequently block the flow of blood in the narrow capillaries. This interruption in the supply of O2 leads to localized anoxia (oxygen deprivation) in the tissue, causing pain and eventually ischemic death (infarction) of cells in the vicinity of the blockage. Anoxia also leads to an increase in deoxygenated HbS. Compared to normal RBC, sickled cells have a decreased ability to deform so there is increased hemolysis. Normal life span of RBCs is 120 days but in sickle cell disease it is less than 20 days, hence causing hemolytic anemia. The liver has the capacity to conjugate and excrete >3,000 mg of bilirubin/day, whereas the normal production of bilirubin is only 300 mg/day. This excess capacity allows the liver to respond to increased heme degradation with a corresponding increase in conjugation and secretion of CB. However, extensive hemolysis in patients with sickle cell anemia may produce bilirubin faster than it can be conjugated. UCB levels in the blood become elevated causing unconjugated hyperbilirubinemia.	02,03

MBBS 1ST PROFESSIONAL
MODULAR INTEGRATED 2K23
Block-III
(Multiple Choice Questions)

Total Marks: **85**
Time Allowed: **110 MINUTES**

ANATOMY

Topic: Gross Anatomy
Subtopic: Mediastinum
Difficulty level: Moderate
Cognitive level: C2
Reference: Snell's Clinical Anatomy by Regions, 9th Edition; Page no. 59

Q.1 A 14-year-old boy came in emergency department after a fight with mild bleeding just above the collar bone. On examination a stab wound was found just above his right clavicle. What important structure lies there?

a) Apex of lung
b) Root of lung
c) Internal thoracic artery
d) Tracheal bifurcation
e) Superior vena cava

Topic: Gross Anatomy
Subtopic: Pericardial sinuses
Difficulty level: Moderate
Cognitive level: C2
Reference: Snell's Clinical Anatomy by Regions, 9th Edition; Page no. 79

Q.2 During cardiac surgery of a 45-year-old male the cardiac surgeon can place her fingers in the transverse pericardial sinus, if necessary. This allows the surgeon to easily place a vascular clamp upon

a) Right and left pulmonary veins
b) Superior and inferior vena cava
c) Right and left coronary arteries
d) Pulmonary trunk and ascending aorta
e) Pulmonary trunk and superior vena cava

Topic: Gross Anatomy
Subtopic: Heart
Difficulty level: Easy
Cognitive level: C1
Reference: Snell's Clinical Anatomy by Regions, 9th Edition; Page no. 85

Q.3 A 54-year-old male is diagnosed with atrial fibrillation. Sinoatrial node Which is source of electrical conductivity of heart is located in:

a) Inferior rim of fossa ovalis
b) Septal cusp of tricuspid valve
c) Triangle of Koch
d) Upper part of crista terminalis
e) Valve of coronary sinus

Topic: Gross Anatomy
Subtopic: Heart
Difficulty level: easy
Cognitive level: C1
Reference: Snell's Clinical Anatomy by Regions, 9th Edition; Page no. 90

Q.4 A 72-year-old male is admitted to the hospital with complaints of severe chest pain radiating to his left arm. Which of the following nerves is responsible for the radiation of pain to the arm during myocardial infarction?

a) Phrenic
b) Vagus
c) Intercostobrachial
d) Greater splanchnic
e) Suprascapular

Topic: Gross Anatomy
Subtopic: Thoracic outlet
Difficulty level: Moderate
Cognitive level: C2
Reference: Snell's Clinical Anatomy by Regions, 9th Edition; Page no. 39

Q.5 A 4-year-old boy came in pediatric OPD with pain on medial side of forearm and hand. Pediatrician also noticed wasting of the small muscles of the hand. On investigation, cervical rib was identified. Which structure is most likely compressed:

a) Common carotid artery

b) Internal thoracic artery
c) Lower trunk of brachial plexus
d) Phrenic nerve
e) Recurrent laryngeal branch of left vagus nerve

Topic: Gross Anatomy
Subtopic: Larynx
Difficulty level: Moderate
Cognitive level: C2
Reference: Snell's Clinical Anatomy by Regions, 9th Edition; Page no. 650

Q.6 A young lady was diagnosed to have thyroid cancer and underwent partial thyroidectomy. Postoperatively she developed a weakness of voice. This is most likely due to injury to:

a) External laryngeal nerve
b) Inferior laryngeal nerve
c) Internal laryngeal nerve
d) Recurrent laryngeal nerve
e) Superior laryngeal nerve

Topic: Gross Anatomy
Subtopic: Diaphragm
Difficulty level: Moderate
Cognitive level: C2
Reference: Snell's Clinical Anatomy by Regions, 9th Edition; Page no. 46

Q.7 A young boy in a fight was brought to the hospital emergency with profuse bleeding from a slit open wound in his right lower neck. He had abnormal respiratory movements. Examination revealed ascent of right dome of diaphragm during inspiration. The nerve/s most likely injured in this case is/are:

a) Bronchial nerve
b) Intercostal nerve
c) Mediastinal branches of vagus nerve
d) Phrenic nerve
e) Trunks of cervical plexus

Topic: Gross Anatomy
Subtopic: Lungs
Difficulty level: Hard
Cognitive level: C1
Reference: Snell's Clinical Anatomy by Regions, 9th Edition; Page no. 78

Q.8 In Bronchogenic carcinoma, lymphatic spread via bronchomediastinal trunks may result in early involvement of:

a) Anterior cervical lymph nodes
b) Aortic lymph nodes
c) Lower deep cervical lymph nodes
d) Paratracheal lymph nodes
e) Superficial cervical lymph nodes

Topic: Histology
Subtopic: Blood vessels
Difficulty level: Hard
Cognitive level: C3
Reference: Laiq Hussain Siddiqui, General Histology 5th Revised Edition; Page no. 142

Q.9 A 50-year-old presented with a history of shortness of breath and sweating upon exertion. Investigation revealed partial occlusion of two arteries by plaques, supplying the heart. The most likely underlying cause is:

a) Atheroma in tunica media of vessels
b) Deposition of lipid material in tunica intima of arteries
c) Loss of elasticity of arterial wall
d) Progressive degenerative changes in subendothelial connective tissue
e) Thickening in tunica adventitia of arterial wall

Topic: Histology
Subtopic: Respiratory Epithelium
Difficulty level: Easy
Cognitive level: C1
Reference: Laiq Hussain Siddiqui, General Histology 5th Revised Edition; Page no 191

Q.10 First year student is given a slide of respiratory tract whose epithelium is characterized by:

a) Dense avascular lamina propria
b) Interspersed sustentacular cells
c) Pseudostratified columnar epithelium with stereocilia
d) Scattered olfactory cells
e) Thick basal lamina

Topic: Embryology
Subtopic: Heart tube
Difficulty level: Moderate
Cognitive level: C2
Reference: Langman's Medical Embryology, 12th Edition; Page no. 167

Q.11 A child is born with severe craniofacial defects and transposition of the great vessels. What cell population may play a role in both abnormalities

a) Ectoderm
b) Endoderm
c) Mesoderm
d) Neural crest cells
e) Hypoblast

Topic: Embryology
Subtopic: Sinus venosus
Difficulty level: Easy
Cognitive level: C1
Reference: Langman's Medical Embryology, 12th Edition; Page no. 170

Q.12 While examining a child for congenital heart defects, the professor asks the first-year internee about the structure derived from the left horn of sinus venosus:

a) Conus cordis
b) Coronary sinus
c) Sinus venarum
d) Septum spurium
e) Valve of inferior vena cava

Topic: Embryology
Subtopic: Development of veins
Difficulty level: Moderate
Cognitive level: C2
Reference: Langman's Medical Embryology, 12th Edition; Page no. 210

Q.13 Vitelline veins that carry blood from yolk sac to sinus venosus forms anastomotic network around dudenum that develops into

a) Azygous vein
b) Internal jugular vein
c) Left brachiocephalic vein
d) Proximal segment of superior vena cava
e) Portal vein

Topic: Embryology
Subtopic: Developmental defects of heart and vessels
Difficulty level: Moderate
Cognitive level: C2
Reference: Langman's Medical Embryology, 12th Edition; Page no. 189

Q.14 A premature newborn had respiratory difficulties. Examination and investigations revealed a congenital anomaly resulting from failure of normal involution of a fetal vessel connecting pulmonary and systemic circulations. The vessel most likely involved in this anomaly is:

a) Ductus arteriosus
b) Ductus venosus
c) First aortic arch artery
d) Left vitelline artery
e) Right superior cardinal vein

Topic: Embryology
Subtopic: Diaphragm
Difficulty level: Hard
Cognitive level: C3
Reference: Langman's Medical Embryology, 12th Edition; Page no. 93

Q.15 **On examination of X-ray chest of a child with complaints of cyanosis, abnormal chest development is seen with one side being larger than the other and abdomen that appears caved in. The child is diagnosed with Congenital diaphragmatic hernia. The anatomical basis for cyanosis in this case is:**

a) Omphalocele
b) Congenital hypertrophic pyloric stenosis
c) Eventration of diaphragm
d) Oligohydramnios
e) Pulmonary hypoplasia

Topic: Embryology
Subtopic: Lungs
Difficulty level: moderate
Cognitive level: C2
Reference: Langman's Medical Embryology, 12th Edition; Page no. 219

Q.16 **A prenatal ultrasound revealed polyhydramnios, and at birth, the baby had excessive fluids in its mouth. What type of birth defect might be present?**

a) Atrial septal defect
b) Anal atresia
c) Congenital cyst of lung
d) Tracheoesophageal atresia
e) Ventricular septal defect

PHYSIOLOGY

Topic: CVS
Subtopic: Local Control of Blood Flow
Difficulty Level: Moderate
Cognitive level: C2

Q.17 **Which of the following is expected to occur in response to an increase in shear stress in a blood vessel?**

a) Decreased prostacyclin production
b) Decreased endothelin production
c) Decreased cGMP production
d) Increased nitric oxide release
e) Increased renin production

(Reference: Guyton & Hall 14th Ed; Chapter 17: Page 210)

Topic: CVS
Subtopic: Local Control of Blood Flow
Difficulty Level: Moderate
Cognitive level: C2

Q.18 **Which of the following chemicals must be blocked to produce vasodilation in a blood vessel?**

a) Adenosine
b) Adenosine phosphate
c) Histamine
d) Nitric oxide
e) Endothelin

(Reference: Guyton & Hall 14th Ed; Chapter 17: Page 206-210)

Topic: CVS
Subtopic: Shock
Difficulty Level: Hard
Cognitive level: C3

Q.19 **A 35-year-old patient was operated under spinal anesthesia. One hour after surgery a large decrease in arterial pressure was observed. There was no history of excessive blood loss during and after surgery. What is the most likely cause of shock in this condition?**

a) Brain damage
b) Blockage of sympathetic outflow

c) Reduced parasympathetic stimulation
d) Generalized toxemia
e) Depression of vasomotor center

(Reference: Guyton & Hall 14th Ed, Chapter 24, Page 300)

Topic: CVS
Subtopic: Shock
Difficulty Level: Hard
Cognitive level: C3

Q.20 A 25-year-old woman is brought to the emergency after excessive blood loss during childbirth. Her pulse rate is 110/min, blood pressure is 60/40 mm Hg and her hands and feet are cold. Her condition does not improve after initial treatment. Which of the following factors causes progression of the shock in her condition?

a) Cardiac depression
b) Decreased capillary permeability.
c) Stress relaxation of vein
d) Increased secretion of vasopressin
e) Increased secretion of renin by the kidneys

(Reference: Guyton & Hall 14th Ed, Chapter 24, Page 296)

Topic: CVS
Subtopic: Shock
Difficulty Level: Easy
Cognitive level: C1

Q.21 A 45-year-old male developed circulatory shock but his cardiac output increased. What could be the type of shock?

a) Septic
b) Anaphylactic
c) Hemorrhagic
d) Cardiogenic
e) Neurogenic

(Reference: Guyton & Hall 14th Ed, Chapter 24, Page 300)

Topic: CVS
Subtopic: Types of Blood vessels
Difficulty Level: Easy
Cognitive level: C1

Q.22 The blood flowing in the vascular system is called laminar flow when:

a) The rate of blood flow becomes too great
b) It passes over an obstruction in the vessel
c) It makes a sharp turn while passing through the vessels
d) It passes over a rough endothelial surface
e) Central most portion of the blood stays in center

(Reference: Guyton & Hall, 14th Ed. Chapter 14, Page 175)

Topic: Cardiovascular System
Subtopic: Cardiac Cycle
Difficulty level: Moderate
Cognitive level: C2

Q.23 A young man is undergoing a medical fitness exam. His investigations show a stroke volume of 70ml and an end diastolic volume of 120 ml. His end systolic volume will be:

a) 20 ml
b) 30 ml
c) 40 ml
d) 50 ml
e) 60 ml

(Reference: Guyton & Hall, 14th Ed. Page 119)

Topic: Cardiovascular System
Subtopic: Cardiac Output
Difficulty level: easy
Cognitive level: C1

Q.24 Cardiac output is increased maximally during:

a) Intake of meals

b) Excitement
c) Anxiety
d) Fever
e) Exercise

(Reference: Guyton & Hall, 14th Ed. Page 247)

Topic: Cardiovascular System
Subtopic: Heart sounds
Difficulty level: Moderate
Cognitive level: C2

Q.25 A 22-year-old medical student auscultates the chest of a healthy subject and identifies the first heart sound. This sound corresponds to which phase to the cardiac cycle?

a) Atrial systole
b) Isovolumic contraction
c) Isovolumic relaxation
d) Rapid ejection
e) Atrial distole

(Reference: Guyton & Hall 14th Ed; chapter 23 page 283)

Topic: Cardiovascular System
Subtopic: Regulation of BP
Difficulty level: Moderate
Cognitive level: C2

Q.26 A 55-year-old man is having a high intracranial pressure. Blood flow to his brain will be maintained by:

a) Baroreceptor reflex
b) Chemoreceptor
c) Bain Bridge reflex
d) Cushing's reaction
e) Atrial volume reflex

(Reference: Guyton & Hall, 14th Ed. Page 226)

Topic: CVS
Subtopic: Blood pressure
Difficulty level: Moderate
Cognitive level: C2

Q.27 Arterial pressure of a 40-year-old man is measured by auscultatory method using mercury sphygmomanometer. The systolic pressure is 140 mmHg and diastolic pressure is 110 mmHg. His mean arterial pressure will be:

a) 110 mmHg
b) 120 mmHg
c) 125 mmHg
d) 130 mmHg
e) 140 mmHg

(Reference: Guyton & Hall, 14th Ed. Pg # 221-222)

Topic: CVS
Subtopic: Arrhythmias
Difficulty level: Hard
Cognitive level: C3

Q.28 A scientist is studying the phenomenon of ventricular fibrillation in an experimental animal. Which of the following factors can decrease the risk of this condition?

a) An increased size of the heart
b) An increased ventricular refractory period
c) Decreased electrical conduction velocity
d) Exposure of the heart to 60-cycle alternating current
e) Epinephrine administration

(Ref: Guyton & Hall 14th edition, chapter 13, page 163)

Topic: CVS
Subtopic: Arrhythmias
Difficulty level: Hard
Cognitive level: C3

Q.29 A 50-year-old man having fainting spells for a few days is placed on a 24-hour ECG monitoring. During the episodes, his ECG shows a ventricular rate of 25 beats/min and 100 P waves per minute. After about 30 seconds of fainting, a normal sinus rhythm recurs. What is his likely diagnosis?

a) Atrial flutter

b) First-degree A-V block
c) Second-degree A-V block
d) Ventricular fibrillation
e) Stokes-Adams syndrome

(Ref: Guyton & Hall 14th edition, chapter 15, page 188)

Topic: CVS
Subtopic: Arrhythmias
Difficulty level: Hard
Cognitive level: C3

Q.30 A young girl presents in the emergency with shortness of breath and palpitations. Her pulse is regularly irregular, and ECG shows a PR interval of 0.22 second. This is indicative of:

a) Atrial fibrillation.
b) Complete AV dissociation.
c) First degree AV block
d) Sinoatrial block
e) Ventricular fibrillation

(Ref: Guyton & Hall 14th edition, chapter 13, page 158)

Topic: CVS
Subtopic: Arrhythmias
Difficulty level: Moderate
Cognitive level: C2

Q.31 A 55-year-old female is having a pre-operative assessment for a laparoscopic cholecystectomy in which her ECG shows Q waves in chest leads V1 to V4. This is likely to depict:

a) 2nd degree AV block
b) An old infarct
c) SA nodal block
d) Ventricular fibrillation

(Ref: Guyton & Hall 14th edition, chapter 13, page 155)

Topic: Respiration
Subtopic: Regulation of Respiration
Difficulty Level: hard
Cognitive level: C3

Q.32 A 55-year-old man is brought to the emergency. His arterial blood gas analysis shows a PO_2 of 70 mmHg. Which of the following receptors will respond to this fall in PO_2?

a) Receptor in pons
b) J receptors
c) Pulmonary stretch receptors
d) Medullary chemoreceptors
e) Peripheral chemoreceptors

(Reference: Guyton & Hall; 14th Ed. Chapter 42: Page 534)

Topic: Respiration
Subtopic: Regulation of Respiration
Difficulty Level: Moderate
Cognitive level: C2

Q.33 A 50-year-old man is sitting and reading the newspaper. Which of the following respiratory neurons will be inactive during this process?

a) Dorsal respiratory group of neurons
b) Ventral respiratory group of neurons
c) Apneustic Center
d) Pneumotaxic center
e) Nuclei near tractus solitarius

(Reference: Guyton & Hall; 14th Ed. Chapter 42: Page 530)

Topic: Respiration
Subtopic: Restrictive lung disease
Difficulty level: Moderate
Cognitive level: C2

Q.34 A patient is suffering from pulmonary fibrosis. His spirometry will show increased:

a) Residual volume
b) Functional residual capacity
c) Forced vital capacity (FVC)
d) Forced expiratory volume in first second (FEV_1)
e) FEV_1/FVC ratio

(Reference: Guyton & Hall, 14th Ed. Page 543)

Topic: Respiration
Subtopic: High Altitude Physiology
Difficulty level: Moderate
Cognitive level: C2

Q.35 A person residing at high altitude for a long period develops chronic mountain sickness. He will have a decreased:

a) Red cell mass
b) Pulmonary arterial pressure
c) Right ventricular size
d) Peripheral arterial pressure
e) Pulmonary arterial resistance

(Reference: Guyton & Hall, 14th Ed. Page 557)

Topic: Respiration
Subtopic: Pulmonary ventilation
Difficulty level: Easy
Cognitive level: C1

Q.36 Which of the following changes occurs in the thoracic cavity when the diaphragm contracts?

a) Anteroposterior diameter of thorax is increased
b) Anteroposterior diameter of thorax is decreased
c) Vertical diameter of thorax is increased
d) Vertical diameter of thorax is decreased
e) Both anteroposterior and vertical diameter of thorax are increased

(Reference: Guyton & Hall, 14th Ed. Pg #432)

Topic: Respiration
Subtopic: Pulmonary Ventilation
Difficulty level: Moderate
Cognitive level: C2

Q.37 A baby boy born at 6 months of gestational age has bluish color of the skin and rapid breathing. The underlying cause of his condition is:

a) Compression of umbilical cord
b) Decreased surface tension forces
c) Deficiency of surfactant
d) Increased lung compliance
e) Increased dead space volume

(Reference: Guyton & Hall, 14th Ed. Pg #494)

Topic: Respiratory System
Subtopic: Pulmonary Ventilation
Difficulty level: Moderate
Cognitive level: C2

Q.38 A 3-year-old boy choked on a bite of fruit and started having a bout of cough. Which of the following nerves will carry the afferent impulses from the respiratory passages in his condition?

a) Glossopharyngeal nerve.
b) Hypoglossal nerve.
c) Trigeminal nerve.
d) Vagus nerve.
e) Facial nerve

(Reference: Guyton & Hall, 14th Ed. Pg #499)

Topic: Respiration
Subtopic: Transport of gases
Difficulty level: Moderate
Cognitive level: C2

Q.39 The CO_2 is transported from the tissues to the lungs predominantly in the form of bicarbonate ion. Compared with arterial red blood cells, which of the following options best describes venous red blood cells?

	Intracellular Chloride Concentration	Cell Volume
a)	Decreased	Decreased
b)	Decreased	Increased
c)	Decreased	No change
d)	Increased	Decreased
e)	Increased	Increased

(Ref: Guyton & Hall 14th edition, chapter 41, page 528)

Topic: Respiration
Subtopic: Transport of gases
Difficulty level: Moderate
Cognitive level: C2

Q.40 A shift of the oxygen-hemoglobin dissociation curve to the right in the peripheral tissues enhances the release of O_2 from the blood in the tissues. This is known as:

a) Tissue oxygen buffer system
b) Bohr effect
c) Haldane Effect
d) Safety factor for diffusion of O_2
e) Respiratory exchange ratio

(Ref: Guyton & Hall 14th edition, chapter 41, page 526)

Topic: Respiration
Subtopic: Deep sea diving
Difficulty level: Moderate
Cognitive level: C2

Q.41 In a deep-sea diver, the volume of dissolved nitrogen (liter) at the depth of 100 feet is:

a) 1
b) 2
c) 3
d) 4
e) 5

(Ref: Guyton & Hall, 14th Ed. Page 563)

Topic: CVS
Subtopic: Cardiac output
Difficulty level: Easy
Cognitive level: C1

Q.42 The factor that mainly controls the cardiac output is:

a) Blood viscosity
b) Atrial pressure
c) Heart rate
d) Ventricular pressure
e) Venous return

(Ref: Guyton & Hall, 14th Ed. chapter 20; page 245)

Topic: CVS
Subtopic: Conducting system
Difficulty level: Moderate
Cognitive level: C2

Q.43 In the human heart, cardiac impulse is delayed in the AV node for 0.09 seconds. The basic reason for this delay is:

a) Membrane leakiness to sodium ions
b) Large size of A.V nodal fibers
c) Numerous gap junctions
d) Scanty gap junctions
e) Short refractory period

(Ref: Guyton & hall, 14th Ed. chapter 10, page 12)

Topic: CVS
Subtopic: Cardiac cycle
Difficulty level: Moderate
Cognitive level: C2

Q.44 Which of the following parameters is decreased by increasing the force of myocardial contraction in the cardiac cycle?

a) Cardiac output
b) Ejection fraction
c) End systolic volume
d) End diastolic volume
e) Stroke volume

(Ref: Guyton & Hall, 14th Ed. chapter 9: page 119-120)

Topic: CVS
Subtopic: Cardiac cycle
Difficulty level: Easy
Cognitive level: C1

Q.45 During cardiac cycle, pulmonary valve opens when right ventricular pressure just exceeds:

a) 3 mmHg

b) 8 mmHg
c) 25 mmHg
d) 80 mmHg
e) 120 mmHg

(Ref: Guyton & Hall, 14th Ed. Page 118)

Topic: CVS
Subtopic: Cardiac cycle
Difficulty level: Moderate
Cognitive level: C2

Q.46 When left ventricular pressure during the cardiac cycle rises above 80mmHg, there is:
a) Closure of mitral valve
b) Closure of tricuspid valve
c) Closure of aortic valve
d) Opening of aortic valve
e) Opening of pulmonary valve

(Ref: Guyton & Hall, 14th Ed. chapter 9 page 119)

Topic: CVS
Subtopic: ECG
Difficulty level: Moderate
Cognitive level: C2

Q.47 When the atria are completely depolarized and cardiac impulse is at the AV node, the ECG tracing at this instance will show:
a) S-T Segment
b) T-P Segment
c) P-R Segment
d) P-R interval
e) Q-T interval

(Ref: Guyton & Hall, 14th Ed. chapter 11, page 137)

BIOCHEMISTRY

Topic: Lipids
Subtopic: Chemistry of Cholesterol
Difficulty Level: Easy
Cognitive Level: C1

Q.48 Cholesterol is essential for normal membrane functions because it:
a) Cannot be made by higher organisms.
b) Spans the thickness of the bilayer.
c) Affects the fluidity of membranes.
d) Catalyzes lipid flip-flop in the bilayer.
e) Responsible for message transduction.

Reference: Lippincott's 8th Edi Pg No. 662

Topic: Lipids
Subtopic: Cholesterol metabolism
Difficulty Level: Moderate
Cognitive Level: C3

Q.49 A 45-year-old lady is being treated for coronary artery disease. For associated hypercholesterolemia, she is prescribed a group of drugs which inhibits an enzyme required for cholesterol biosynthesis. Which of the following enzymes is inhibited by the drug?
a) Methyl Malonyl CoA mutase
b) Propionyl CoA Reductase
c) HMG CoA Reductase
d) HMG CoA Synthase
e) Squalene synthase

Reference: Lippincott's 8th Edi Pg No. 669

Topic: Lipids
Subtopic: Chemistry of Lipids
Difficulty Level: Hard
Cognitive Level: C3

Q.50 A newborn infant had trouble breathing at birth. The infant was 3 months premature. The physicians treated the infant with a solution, which was directly injected into the lungs. Within seconds, the infant responded with much improved breathing. A major component of this solution is:

a) Phosphatidylcholine derivative
b) Phosphatidylethanolamine derivative
c) Phosphatidylserine derivative
d) Phosphatidylglycerol derivative
e) Phosphatidylinositol derivative

Reference: Lippincott's 8th Edi Pg No. 620

Topic: Phospholipids
Subtopic: Biochemical significance of Phospholipids
Difficulty Level: Moderate
Cognitive Level: C2

Q.51 Which of the following is present in bacterial cell membrane and stimulates antibody response which is used to diagnose its infection?

a) Phosphatidic acid
b) Phosphatidylserine
c) Cardiolipin
d) Plasmalogen
e) Platelet activating factor

Reference: Lippincott's 8th Edi Pg No. 202

Topic: Lipids
Subtopic: Chemistry of Lipids
Difficulty Level: Easy
Cognitive Level: C1

Q.52 5. The form in which most dietary lipids are packaged and exported in blood from intestinal mucosa to the periphery is as

a) Mixed micelles
b) Free triacylglycerol
c) Free fatty acids
d) Chylomicron
e) Diacyl glycerol

Reference: Lippincott's 8th Edi Pg No. 690

Topic: Lipids
Subtopic: Chemistry of Lipids
Difficulty Level: Easy
Cognitive Level: C1

Q.53 Which out of the following fatty acids is a precursor of prostaglandins?

a) Linoleic acid
b) Arachidonic acid
c) Eicosapentaenoic acid
d) Linolenic acid
e) Palmitic acid

Reference: Lippincott's 8th Edi Pg No. 646

Topic: Lipids
Subtopic: Structure of lipoproteins
Difficulty Level: Moderate
Cognitive Level: C2

Q.54 Lipoproteins facilitate the delivery of their lipid components from the liver to the periphery and keep them soluble. Which of the following is the correct arrangement of these molecules?

a) Hydrophobic head outside; hydrophilic tail inside
b) Hydrophobic tail outside; hydrophilic head inside
c) Hydrophilic head outside; hydrophobic tail inside
d) Hydrophilic tail outside; hydrophobic head inside
e) Hydrophilic tail outside; hydrophilic head inside

Reference: Lippincott's 7th Edi Pg No. 227

Topic: Lipids
Subtopic: Classification of fatty acids
Difficulty Level: Moderate
Cognitive Level: C3

Q.55 A child presents to the OPD with history of repeated chest infections. He is showing retarded growth. His mother says that she feels his skin is salty. He passes pale, large volume, foul smelling loose stools. Which of the following will be included in the supplements to make up for the deficiencies produced in his case?

a) Short and medium chain fatty acids
b) Short and long chain fatty acids
c) Medium and long chain fatty acids
d) Medium and very long chain fatty acids
e) Long and very long chain fatty acids

Reference: Lippincott's 7th Edi Pg No. 177

Topic: Lipids
Subtopic: Lipoproteins
Difficulty Level: Moderate
Cognitive Level: C2

Q.56 Which of the following lipoprotein particles are most likely responsible for the plaque formation in an arterial wall after being oxidized?

a) Chylomicrons
b) High density lipoproteins
c) Intermediate-density lipoproteins
d) Low density lipoproteins
e) Very-low-density lipoproteins

Reference: Lippincott's 8th Edi Pg No. 546

Topic: Enzymology
Subtopic: Clinical enzymology
Difficulty level: Moderate
Cognitive level: C2

Q.57 A patient was diagnosed to have acute MI. Which one of the following enzyme preparations is given I/V to dissolve the clot in his coronary artery?

a) Glucocerebrosidase
b) Heparin
c) Papain
d) Streptokinase
e) Urokinase

Reference: Harper's 32nd Edition pg No. 686

Topic: Enzymes
Subtopic: Isoenzymes
Difficulty level: Easy
Cognitive level: C1

Q.58 Which of the following statement describes isozymes:

a) They are catalytically active proteolytic degradation products of certain enzymes
b) They are catalytically inert enzymes of identical function in different cells.
c) They are molecular forms of enzymes catalyzing the same reaction in different cells.
d) They are enzymes of identical function that are isolated from different species
e) They are conformational isomers of multi-subunit regulatory proteins

Reference: Lippincott's 8th Edi Pg No. 221

Topic: Enzymes
Subtopic: Enzyme inhibition
Difficulty level: Hard
Cognitive level: C3

Q.59 A 10-year-old boy presents with vomiting, sweating, drooling, and a decreased heart rate. His friends state that he was in a corn field when it was sprayed by a crop duster. The chemical being sprayed was an organophosphate derivative that covalently binds to a cholinergic enzyme found at postsynaptic neuromuscular junction and inactivates it. What type of inhibition is being displayed?

a) Competitive
b) Noncompetitive
c) Irreversible
d) Feedback
e) Allosteric

Reference: Lippincott's 8th Edi Pg No.208

Topic: Enzymes
Subtopic: Enzyme kinetics
Difficulty level: Moderate
Cognitive level: C1

Q.60 A numerical value of Km reflects which of the following?

a) Concentration of the enzyme that gives half of Vmax
b) Concentration of the substate that gives half of Vmax
c) Half of the substrate concentration required to achieve Vmax
d) Total substrate concentration required to achieve Vmax
e) Dissociation constant for enzyme substrate complex.

Reference: Lippincott's 8th Edi Pg No.202

Topic: Enzymology
Subtopic: Enzyme inhibitors as drugs
Difficulty level: Moderate
Cognitive level: C3

Q.61 A competitive reversible inhibitor such as physostigmine is used to treat glaucoma and myasthenia gravis and to reverse anticholinergic syndrome. Based on this, which one of the following statements is true concerning the clinical implications of using physostigmine?

a) Use of the drug will decrease the Km of the targeted enzyme
b) Use of the drug will increase the Km of the targeted enzyme
c) Use of the drug will increase the Vmax of the targeted enzyme
d) Use of the drug will decrease the Vmax of the targeted enzyme
e) Use of the drug will increase both Km and Vmax of the targeted enzyme

Reference: Lippincott's 8th Edi Pg No.206

Topic: Enzymology
Subtopic: Cardiac markers
Difficulty level: Moderate
Cognitive level: C2

Q.62 A 70- year- old man was admitted to hospital emergency with a history of chest pain. Which one of the following enzymes will give you maximum information about myocardial ischemia?

a) Lactate dehydrogenase
b) ALT
c) CK-MB
d) ALP
e) Amylase.

Reference: Lippincott's 8th Edi Pg No.221

Topic: Acid base balance
Subtopic: Metabolic alkalosis (interpretation of ABGs)
Difficulty level: Hard
Cognitive level: C3

Q.63 In a man undergoing surgery, it was necessary to aspirate the contents of the upper gastrointestinal tract. After surgery, the following values were obtained from an arterial blood sample: pH 7.55, PCO2 52 mm Hg and HCO3 - 40 mmol/l. What is the underlying disorder?

a) Metabolic Acidosis
b) Respiratory Acidosis
c) Metabolic Alkalosis
d) Respiratory Alkalosis
e) Compensated Metabolic Acidosis.

Reference: Essentials of medical biochemistry by Mushtaq Ahmad 8th Edition, Vol II, Chap 14, Regulation of plasma pH and Acid based disturbance

Topic: Acid Base Balance
Subtopic: Respiratory acidosis
Difficulty level: Hard
Cognitive level: C3

Q.64 A 45-year-man is having chronic cough with difficulty in breathing for several weeks. He avoids visiting his physician regularly. Now with severe breathlessness, he visits the doctor. His arterial blood sample shows pH 7.2, PCO2 55 mmHg and HCO3 23 mmol/l. Which one of the following conditions DOES NOT cause the above picture?

a) Acute Asthma
b) Diaphragm paralysis

c) Chronic bronchitis
d) Obstructive sleep apnoea
e) Severe kyphoscoliosis.

Reference: Essentials of medical biochemistry by Mushtaq Ahmad 8th Edition, Vol II, Chap 14, Regulation of plasma pH and Acid based disturbance

Topic: Emphysema and elastin
Subtopic: Emphysema
Difficulty level: Moderate
Cognitive level: C2

Q.65 A 30-year-old woman presents with progressive dyspnea (shortness of breath). She has no history of cigarette smoking. Family history reveals that her sister also has problems with her lungs. Which one of the following etiologies most likely explains this patient's pulmonary symptoms?

a) Deficiency of ascorbic acid
b) Deficiency of α1-antitrypsin
c) Deficiency of prolyl hydroxylase
d) Deficiency of elastase
e) Deficiency of lysyl hydroxylase

Reference: Lippincott's 8th edition Pg No. 178

COMMUNITY MEDICINE & PUBLIC HEALTH

Topic: Epidemiology of Respiratory Diseases
Subtopic: The burden of respiratory diseases
Difficulty level: Moderate
Cognitive level: C2

Q.66 Respiratory diseases are commonly acquired by aerosolized droplets, spread by sneezing and coughing. Which ONE of the following types of respiratory disease out numbers others at global mortality ranking:

a) Pneumonia
b) Tuberculosis
c) Measles
d) Diphtheria
e) Pertussis

Reference: Page 782 Public Health and Community Medicine Ilyas Ansari 8th ed

Topic: Interaction of environment & Respiratory system
Subtopic: Effect of air pollutants on the respiratory system
Difficulty level: Moderate
Cognitive level: C2

Q.67 Acute Respiratory Infections are often classified by clinical syndromes depending upon the site of infection. They are referred to as ARI of upper (AURI) or lower (ALRI) respiratory tract based on which ONE of the following anatomical structures dividing into AURI or ALRI:

a) Palate
b) Epiglottis
c) Pharynx
d) Larynx
e) Bronchus

Reference: Page 177 PSM K Park 24th ed

Topic: Occupational Lung Diseases
Subtopic: Common respiratory diseases related to occupation
Difficulty level: Hard
Cognitive level: C1

Q.68 A particulate dust which is inhaled into the respiratory tract is called respirable dust. It is mainly responsible for causing 'Pneumoconiosis', if its size comes in which of the following range:

a) Less than 0.1 microns
b) Less than 5 microns
c) More than 5 microns
d) More than 100 microns
e) More than 150 microns

Reference: Page 842- PSM K Park 24th ed

Topic: Behavioral Change Interventions
Subtopic: Methods of behavioral change interventions
Difficulty level: Moderate
Cognitive level: C3

Q.69 A public health physician makes consultative meetings with health managers and policy makers to prioritize cardiovascular disease for prevention. This action is most appropriately considered as:

a) Motivation
b) Facilitation
c) Counseling
d) Awareness
e) Advocacy

Reference: K. Park 34

Topic: Prevention of cardiovascular diseases
Subtopic: Primordial Prevention
Difficulty level: Moderate
Cognitive level: C2

Q.70 The control of fat contents through promulgation of food legislation, in order to prevent cardiovascular disease in the community, is best matching with which category of prevention.

a) Primordial prevention
b) Primary prevention
c) Health promotion
d) Secondary prevention
e) Host defense

Reference: K. Park Page 46, 388

Topic: Non-Communicable diseases
Subtopic: Cardiovascular disease risk factors
Difficulty level: Easy
Cognitive level: C1

Q.71 During the last two decades, developing countries are facing the double burden of disease due to rapid rise of non-communicable diseases. The most significant risk factor associated with this is:

a) Improved social status
b) Access to multinational food chains
c) Sedentary Jobs habits
d) Increased consumption of fats
e) Increase in obesity

Reference: K. Park 383 -385

BEHAVIORAL SCIENCES

Topic: CVS
Subtopic: Personal Psycho-social and Vocational Issue
Difficulty level: moderate
Cognitive level: C2

Q.72 A 55-year-old man, occasional smoker presented with the complaint of chest pain and radiating to left arm is diagnosed with Ischemic Heart Disease. On history he found to have strained relationship with his family. Which one of the following is the psychosocial factor in causation of his illness?

a) Low self esteem
b) Smoking
c) Stress at home
d) Pollution
e) Fatty food

Reference: Handbook of Behavioral Sciences 3rd edition by Brig. Mowadat Hussain Rana page: 157

Topic: Respiratory
Subtopic: psychogenic cough
Difficulty level: Moderate
Cognitive level: C2

Q.73 **An 18-year-old female has intermittent episode of dry cough. Cough starts whenever there is fight among parents and not relieved by inhalers or medicines. Her all tests are with in normal range. She had been to many physicians but all in vain. What could be the possible diagnosis?**

a) Asthma
b) COPD
c) Pneumonia
d) Psychogenic Cough
e) Seasonal Flue

Reference: Handbook of Behavioral Sciences 3rd edition by Brig. Mowadat Hussain Rana page:181

PATHOLOGY

Topic: Respiratory System
Sub-topic: Obstructive Lung Disease
Difficulty level: Moderate
Cognitive level: C2

Q.74 **A 34-year-old man is suddenly develops severe dyspnea with wheezing chest. Radiograph shows increased lucency in all lung fields. A sputum cytology specimen shows Curschmann spirals, Charcot-Leyden crystals, and acute inflammatory cells in background of abundant mucus. Many of the inflammatory cells are eosinophils. What is the most likely diagnosis?**

a) Bronchiectasis
b) Aspiration
c) Bronchial asthma
d) Centrilobular emphysema
e) Chronic bronchitis

Reference: page no 503, chapter 13, Robbins 10 ed

Topic: Respiratory System
Sub-topic: Restrictive Lung Disease
Difficulty level: Moderate
Cognitive level: C2

Q.75 **A 25-year-old African American non-smoker woman presents with fatigue, dyspnea, nonproductive cough, and chest pain. A chest radiograph shows prominent bilateral hilar lymphadenopathy and diffuse reticular densities in the interstitium of the lung. Laboratory studies reveal polyclonal hyper-gammaglobulinemia, hypercalcemia, and increased serum angiotensin-converting enzyme. Which of the following is the most likely diagnosis?**

a) Acute respiratory distress syndrome
b) Adenocarcinoma of the lung
c) Eosinophilic granuloma
d) Idiopathic pulmonary fibrosis
e) Sarcoidosis

Reference: page no 512, chapter 13, Robbins 10 ed

Topic: Respiratory System
Sub-topic: ARDS
Difficulty level: Moderate
Cognitive level: C1

Q.76 **Histologic sections of lung tissue from an individual with adult respiratory distress syndrome (ARDS) are most likely to reveal:**

a) Angioinvasive infiltrates of pleomorphic lymphoid cells
b) Deposits of needle-like crystals from the membranes of eosinophils
c) Infiltrating groups of malignant cells having intercellular bridges
d) Irregular membranes composed of edema, fibrin, and dead cells lining alveoli
e) Plexiform lesions within pulmonary arterioles

Reference: page no 496, chapter 13, Robbins 10 ed

Topic: CVS
Sub-topic: Atherosclerosis
Difficulty level: Moderate
Cognitive level: C2

Q.77 **An autopsy study reveals that evidence for atheroma formation can begin even in children. The gross appearances of the aortas are recorded and compared with microscopic findings of atheroma formation. Which of the following is most likely to be the first visible gross evidence for the formation of an atheroma?**

a) Thrombus
b) Fatty streak

c) Calcification
d) Hemorrhage
e) Exudate

Reference: page no 369, chapter 10, Robbins 10 ed

Topic: CVS
Sub-topic: MI
Difficulty level: Moderate
Cognitive level: C2

Q.78 Which one of the listed substances has the following characteristic serum changes following a myocardial infarction: levels begin to increase 4 to 6 hr after the onset of chest pain, reach maximal serum concentration in about 12 to 24 hr, and remain elevated for about 3 to 10 days?

a) AST (SGOT)
b) CPK isoenzyme MB
c) LDH (with isotype LDH1 greater than LDH2)
d) ALT (SGPT)
e) Troponin I

Reference: page no 416, chapter 11, Robbins 10 ed

Topic: CVS
Sub-topic: HTN
Difficulty level: Moderate
Cognitive level: C3

Q.79 A 57-year-old man has been having blood pressure measurements in the range of 160/95 to 180/110 mm Hg for many years. He has never taken any medications. A renal scan reveals kidneys of normal size for age. These findings with benign nephrosclerosis are most likely to occur with which of the following change?

a) Hyaline arteriolosclerosis
b) Monckeberg's medial calcific sclerosis
c) Complex calcified atherosclerosis
d) Arterial mural thrombosis
e) Hyperplastic arteriolosclerosis

Reference: page no 367, chapter 10, Robbins 10 ed

Topic: CVS
Sub-topic: Shock
Difficulty level: Moderate
Cognitive level: C2

Q.80 A 20-year-old man is brought to the emergency room after rupturing his spleen in a motorcycle accident. His blood pressure on admission is 80/60 mmHg. Analysis of arterial blood gases demonstrates metabolic acidosis. This patient is most likely suffering from which of the following conditions?

a) Acute pancreatitis
b) Cardiogenic shock
c) Hypersplenism
d) Hypovolemic shock
e) Septic shock.

Reference: page no 116, chapter 4, Robbins 10 ed

PHARMACOLOGY

Topic: Cardiovascular system
Subtopic: Antihypertensive drugs
Difficulty level: Easy
Cognitive level: C1
Reference: Basic and Clinical Pharmacology by Katzung; Chapter:11; Page: 183

Q.81 Which of the following drugs is a Calcium channel blocker used in treatment of hypertension:

a) Propranolol
b) Prazosin
c) Verapamil
d) Digoxin
e) Quinidine

Topic: Cardiovascular system
Subtopic: Anti-arrhythmic drugs
Difficulty level: Moderate
Cognitive level: C1

Reference: Basic and Clinical Pharmacology by Katzung; Chapter: 14; Page: 228

Q.82 The antiarrhythmic agent that primarily belongs to class Ia Na^+ channel group is:

a) Adenosine
b) Quinidine
c) Acebutolol
d) Amiodarone
e) Bepridil

Topic: Respiratory system
Subtopic: Cough suppressants
Difficulty level: Easy
Cognitive level: C1
Reference: Basic and Clinical Pharmacology by Katzung; Chapter: 20; Page: 356

Q.83 Centrally acting cough suppressant is:

a) Acetyl cysteine
b) Bromhexine
c) Carbapentate
d) Dextromethorphan
e) Liquorice

Topic: Respiratory system
Subtopic: Bronchial asthma
Difficulty level: Easy
Cognitive level: C1
Reference: Basic and Clinical Pharmacology by Katzung; Chapter: 20; Page: 351

Q.84 Anti-cholinergic agent that is used in the treatment of bronchial asthma is:

a) Ipratropium bromide
b) Trospium Chloride
c) Salbutamol
d) Zafirlukast
e) Prednisone

Topic: Histamine, serotonin, and ergot alkaloids
Subtopic: Histamine blockers (H1 blockers)
Difficulty level: Easy
Cognitive level: C1
Reference: Basic and Clinical Pharmacology by Katzung; Chapter: 16; Page: 275

Q.85 First generation antihistamines (H1 blockers) include which of the following drugs:

a) Cetirizine
b) Diphehydramine
c) Fexofenadine
d) Loratadine
e) Desloratidine

MBBS 1ST PROFESSIONAL
MODULAR INTEGRATED 2K23
(Short Essay Questions)

Max. Marks: **35**
Time Allowed: **70 MINUTES**

ANATOMY

Topic: Gross Anatomy
Subtopic: Bronchial tree
Difficulty level: Moderate
Cognitive level: C2

1. **An old man had a bout of cough and respiratory difficulties following aspiration of a piece of chicken bone. Which bronchus is more liable for foreign body lodgement and why? What are the common sites of bronchial tree it can descend into? What anatomical landmarks should be kept in mind by surgeon while operating on bronchopulmonary segments.** 0.5,1.5,0.5 2.5

Answer key:

1. **Bronchus more liable for foreign body lodgment** **0.5**
   Right bronchus

Reason: **1.5**
It is wider, shorter, and more vertical than the left one. Thus, it is a more direct continuation of trachea.

Common sites of bronchial tree it can descend into: **0.5**
From here they usually pass into middle or lower lobe bronchi

Bronchopulmonary segments and their surgical correlates

These are anatomic, functional, and surgical units of lungs supplied by segmental (tertiary) bronchi. Each segment has its own segmental artery, lymph vessels, and autonomic nerves. **1.5**
It is a structural unit, so diseased segment of lung can be resected surgically independent of other segments. **01**

Reference: Snell's Clinical Anatomy by Regions, 9th Edition; Page no. 65, 66, 72

Topic: Embryology
Subtopic: Heart
Difficulty level: Hard
Cognitive level: C3

2. **A 4-week-old preterm infant brought to emergency with difficulty in breathing. On auscultation, doctor can appreciate the abnormal heart sound that may depict a hole in heart. Later on, electrocardiography confirms that the infant is suffering from congenital heart disease that gives an appearance of a hole in heart. Give the development of involved septum in this defect.** 05

Answer key:

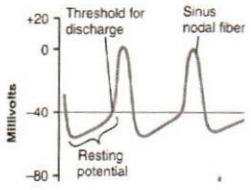
Development of Interatrial Septum

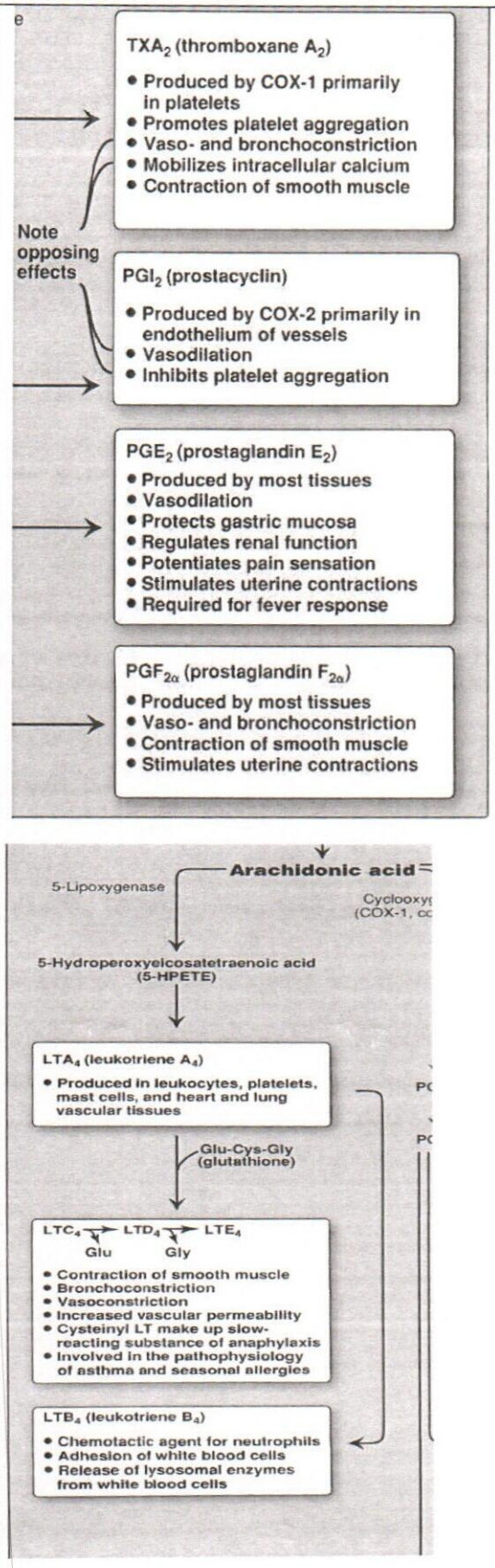
i. **Septum Primum** is a crescentic membrane which grows from the roof of primordial atrium to the fused endocardial cushions. A large opening **osteum primum** is located between its free crescentic edge and the fused endocardial cushions. **(02)**

ii. This foramen reduces and disappears as septum primum fuses with endocardial cushions. Before the closure of foramen primum, perforations appear in the upper part of septum primum and form **osteum secundum.**

	(01) iii. **Septum Secundum** is a muscular fold, grows adjacent to septum primum on its right side. It overlaps osteum secundum. An oval opening **foramen ovale** is formed, which allows most blood from the right atrium to pass into the left atrium. Functional closure of oval foramen after birth, due to high pressure in left atrium than right. The value of oval foramen fuses with septum secundum. **(02)** **Reference: Langman's Medical Embryology, 12th Edition; Page no. 172, 182**	
	PHYSIOLOGY	
	Topic: Cardiovascular system Subtopic: Shock Difficulty Level: Hard Cognitive level:C3	
1.	**A 32-year-old lady was brought to the emergency two days after an abortion in an unhygienic clinic. On examination she was drowsy, her temperature was 104 °F, BP was 70/50 mm Hg and pulse was rapid and thready. Name the type of shock she is suffering from. List the hemodynamic features and pathophysiology of this type of shock.** **Key:** Septic shock **(01)** Pathophysiology of Septic shock **(02)** It is due to widespread Bacterial infection in different parts of the body. Spread of infection is through the blood circulation. Most cases caused by Gram-positive bacteria. Endotoxin producing Gram-negative bacteria. In early stages of septic shock, the patient usually has signs of the bacterial infection As the infection becomes more severe, the circulatory system usually becomes involved because of direct extension of the infection or secondarily as a result of toxins from the bacteria, with resultant loss of plasma into the infected tissues through deteriorating blood capillary walls Hemodynamic features: **(02)** High grade fever, widespread vasodilatation, intravascular clotting in minute blood vessels High cardiac output in perhaps half of patients, caused by: arteriolar dilation in the infected tissues high metabolic rate vasodilation elsewhere in the body, resulting from bacterial toxin stimulation of cellular metabolism high body temperature Sludging of the blood, caused by RBC agglutination in response to degenerating tissues. Development of micro-blood clots in widespread areas of the body, a condition called disseminated intravascular coagulation. Hemorrhage occurs in many tissues, especially in the gut wall of the intestinal tract. Gram –ve bacilli grow and produce toxins which lead to endotoxic shock. Endotoxic shock, in this type a large part of gut is strangulated and loses its blood supply and becomes gangrenous. There finally comes a point at which deterioration of the circulation becomes progressive in the same way that progression occurs in all other types of shock. The end stages of septic shock are not greatly different from the end stages of hemorrhagic shock, even though the initiating factors are markedly different in the two conditions. **(0.25 marks/each point: Total 2.5marks for writing all points)** Reference: Guyton & Hall Textbook of Physiology Ed. 14, pg # 300	01,02,02
	Topic: Cardiovascular system Subtopic: Heart blocks Difficulty Level: Moderate	

	Cognitive level: C3	
2.	**A 60-year-old-man presents with episodes of fainting. During these episodes, his ECG shows dissociation between P wave and QRS complex. Which disorder is this man suffering from? What is the underlying physiological basis for his fainting spells? Enlist the common causes for development of this conduction abnormality.** **Key:** He is Suffering from stoker Adams syndrome (Third degree AV Block) **(01)** Complete AV block occurs abruptly & repeatedly when this occurs blood pressure falls. Blood flow to the brain decreases results into fainting ventricles develops their own rhythms (slow rate), with this patient recovers. **(02)** Ischemia of AV node or AV bundle fibers, compression of AV bundle, inflammation of the AV node or AV bundle, extreme stimulation of the heart by the vagus nerve, degeneration of the AV conduction system and medication such as digitalis or beta-adrenergic antagonists. **Reference: Guyton Page 158, Edition: 14th**	01,02,02
	Topic: Respiration Subtopic: Regulation of respiration Difficulty Level: Moderate Cognitive level: C2	
3.	**A 70-year-old male was brought to emergency department with shortness of breath. On examination, peripheral cyanosis was also noted. Arterial blood gas analysis showed that pH is slightly acidic, PO_2 is 85 mmHg and PCO_2 is 65 mmHg. Which receptors detect these changes in the level of respiratory gases and where are these located. What is the role of these receptors in regulation of respiration?** **Key:** Decreased arterial oxygen stimulates peripheral chemoreceptors located in the carotid and aortic bodies while excess CO_2 or excess H^+ in the blood mainly act directly on chemosensitive area of the respiratory center beneath the medulla's ventral surface. **01** **Role of peripheral chemoreceptors in regulation of respiration: 02** The carotid bodies located bilaterally in the bifurcations of the common carotid arteries send their afferent signal through Hering's nerves to glossopharyngeal nerves and then to the dorsal respiratory area of the medulla. The aortic bodies located along the arch of the aorta send their afferent nerve fibers through the vagi, also to the dorsal medullary respiratory area. When the oxygen concentration in the arterial blood falls below normal, the chemoreceptors become strongly stimulated. The stimulated peripheral chemoreceptors activate the dorsal medullary respiratory area to increase the alveolar ventilation. **Role of chemosensitive area in regulation of respiration: 02** The chemosensitive area located bilaterally beneath the ventral surface of the medulla is highly sensitive to changes in either blood pCO_2 or H^+ concentration, and it in turn excites the other portions of the respiratory center. The sensor neurons in the chemosensitive area are especially excited by H+. The H^+ may be the only important direct stimulus for these neurons. However, H^+ ions do not easily cross the blood–brain barrier. For this reason, changes in H^+ concentration in the blood have considerably less effect in stimulating the chemosensitive neurons than changes in blood CO_2. The CO_2 has little direct effect in stimulating the neurons in the chemosensitive area, it does have a potent indirect effect. The CO_2 passes through the blood–brain barrier very easily. The CO_2 reacts with the water of the tissues to form carbonic acid, which dissociates into H^+ and HCO_3^-; the H^+ then have a potent direct stimulatory effect on respiration. **Reference; Guyton and Hall 14th edition chapter 42 page 533**	01,02,02
	Topic: CVS Subtopic: SA node action potential and ventricular action potential Difficulty Level: Hard Cognitive level: C3	
4.	**Draw a diagram and explain the phases of an action potential in the SA nodal fibres. What happens to the action potential of SA nodal fibers, if voltage-gated Na+ channel blocker (tetrodotoxin) is applied to the cell?** **Key**	04,01

	Sino Atrial Nodal Action Potential: (02)  **RMP:** -55mv **(02)** RMP is unstable due to the inherent leakiness of SA Nodal membrane to sodium and Calcium ions leading to influx of positively charged sodium (funny" current) and Ca ions, causing a slow rise in the resting membrane potential in the positive direction till it reaches the threshold level. Pre-Potential Slope or spontaneous slow depolarization accounts for the Pacemaker activity of SA node i.e. Automaticity **Threshold:** At -40mv there is opening of voltage gated Slow Ca channels **Depolarization:** Slow calcium channels open, which cause influx of Calcium ions resulting in depolarization of SA node. There are no voltage gated Na channels in SA node. **Repolarization:** Opening of K channels result in efflux of K ions, and this causes repolarization to occur. **If tetrodotoxin is applied** to a myocardial auto rhythmic cell, nothing will happen because there are no voltage-gated Na+ channels in the SA nodal fiber **(01)** **(Reference Guyton & Hall, 14th Edition: Chapter 10; Page 128)**	
	BIOCHEMISTRY	
	Topic: Lipid Chemistry Subtopic: Arachidonic acid Difficulty Level: Moderate Cognitive level: C2	
1.	**A teenager, concerned about his weight, attempts to maintain a fat-free diet for a period of several weeks. If his ability to synthesize various lipids were to be examined, he would be found to be most deficient in his ability to synthesize prostaglandins. Deficiency of which fatty acid is responsible for the above scenario. Enlist the principal biological functions of thromboxane A2 and prostaglandins (any two) in platelet homeostasis. Write down the importance of leukotrienes in health & disease.** **KEY:** Deficient fatty acid: Linoleic acid (essential fatty acid) **01**	01,02, 02



Key: Reference: Lippincott's 8th Edition Pg No. 654