



**Faculty of Health Sciences**  
**Higher Diploma in Biomedical Science**

**HD 1213**  
**Anatomy**  
**1<sup>st</sup> year 2<sup>nd</sup> Semester**

**End Semester SEQ Examination**

**1<sup>st</sup> Batch**

**INDEX NUMBER:** .....

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<b>Date</b>	<b>: 28<sup>th</sup> March 2022</b>
<b>Time</b>	<b>: 9.00 a.m. – 11.00 a.m. (Two hours)</b>

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**INSTRUCTIONS TO CANDIDATES**

- This question paper consists of **FOUR** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.
- You are not allowed to take out the examination papers.

- Question 1** (100 marks)
- 1.1 Write short notes on followings.
- 1.1.1 Paranasal sinuses (20 marks)
  - 1.1.2 Respiratory epithelium (20 marks)
- 1.2 List four differences between right and left bronchi. (20 marks)
- 1.3 List the main layers present in heart wall (15 marks)
- 1.4 "Myocardium in left ventricle is thicker than the wall of right ventricle". What is the reason for that? (25 marks)
- Question 2** (100 marks)
- 2.1 Draw a label diagram of a nephron. (25 marks)
- 2.2 Write short notes on followings.
- 2.2.1 Urinary bladder (25 marks)
  - 2.2.2 Prostate gland (25 marks)
- 2.3 Write the differences between male and female urethra. (25 marks)
- Question 3** (100 marks)
- 3.1 Name the three layers of meninges. (15 marks)
- 3.2 Describe a structure of a nerve trunk. (30 marks)
- 3.3 What are the structural differences between anterior pituitary and posterior pituitary? (25 marks)
- 3.4 Describe three histological zones in the adrenal cortex. (30 marks)
- Question 4** (100 marks)
- 4.1 Names all bones in upper limbs. (15marks)
- 4.2 Describe the microscopic structure of human liver. (30 marks)
- 4.3 Describe the difference between exocrine and endocrine pancreas. (30 marks)
- 4.4 Describe the differences between skeletal muscles and smooth muscles. (25 marks)



**Faculty of Health Sciences**  
**Higher Diploma in Biomedical Sciences**  
**HD 1223 Physiology**  
**Batch – 01**  
**1<sup>st</sup> Year 2<sup>nd</sup> Semester**  
**End Semester SEQ Examination**

**INDEX NUMBER:** .....

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**Date** : 30<sup>th</sup> of March 2022  
**Time** : 9.00 am. – 11.00 am (Two Hours)

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**INSTRUCTIONS TO CANDIDATES**

- This question paper consists of **FOUR** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.
- You are not allowed to take out the examination papers.

- Question 01** (100 marks)
- 1.1 List **five** constituents in the glomerular filtrate (15 marks)
  - 1.2 List **five** components that cannot be filtered via glomerulus (15 marks)
  - 1.3 Briefly describe **five** main functions of the kidneys (30 marks)
  - 1.4 Describe the process of urine formation (40 marks)
- Question 02** (100 marks)
- 2.1 List the hormones which are secreted by the ovaries (10 marks)
  - 2.2 State the functions of the hormones stated in question number 2.1 (20 marks)
  - 2.3 List the functions of testosterone hormone (15 marks)
  - 2.4 State the functions of each structure of the male reproductive system (25 marks)
  - 2.5 Describe the spermatogenesis process (30 marks)
- Question 03** (100 marks)
- 3.1 List **four** constituents of saliva (10 marks)
  - 3.2 Write short notes on functions of following organs
    - 3.2.1 Stomach (20 marks)
    - 3.2.2 Small intestine (20 marks)
    - 3.2.3 Large intestine (20 marks)
  - 3.3 Describe 03 phases of gastric juice secretion (30 marks)
- Question 04** (100 marks)
- 4.1 List **five** functions of respiratory system (10 marks)
  - 4.2 Write short notes on followings
    - 4.3.1 Inspiration (20 marks)
    - 4.3.2 Expiration (20 marks)
  - 4.3 Outline the factors affecting for Lung compliance (10 marks)
  - 4.4 List the **four** major components of conduction system of the heart (10 marks)
  - 4.5 Describe the process of blood circulation through the heart (30 marks)



**Faculty of Health Sciences**  
**Higher Diploma in Biomedical Sciences**  
**HD 1233 – Biochemistry**  
**Batch – 01**  
**1<sup>st</sup> Year 2<sup>nd</sup> Semester**  
**End semester SEQ Examination**

**INDEX NUMBER:** .....

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**Date** : 06<sup>th</sup> of April 2022  
**Time** : 9.00 am. – 12.00 pm (Three Hours)

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**INSTRUCTIONS TO CANDIDATES**

- This question paper consists of **SIX** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.
- You are allowed to use a scientific calculator for the examination.
- You are not allowed to take out the examination papers.

**QUESTION 01****(100 marks)**

- 1.1. Write a short note on chemiosmosis mechanism of ATP synthesis. (30 marks)
- 1.2. Discuss the role of glycerol-3-phosphate shuttle. (40 marks)
- 1.3. Explain the role of ubiquinone in electron transport chain. (30 marks)

**QUESTION 02****(100 marks)**

- 2.1. Define reducing and non-reducing sugars. (10 marks)
- 2.2. Differentiate Phosphofructokinase-1 and Fructose 1,6-bisphosphatase. (30 marks)
- 2.3. Outline the reaction steps involved in the citric acid cycle. (30 marks)
- 2.4. Describe the role of glycogen phosphorylase in glycogen metabolism. (30 marks)

**QUESTION 03****(100 marks)**

- 3.1. Describe the digestion and absorption of dietary lipids. (25 marks)
- 3.2. Discuss the biological functions of lipids. (25 marks)
- 3.3. Illustrate fatty acid synthase complex. (25 marks)
- 3.4. Describe the hormonal regulation of cholesterol biosynthesis. (25 marks)

**QUESTION 04****(100 marks)**

- 4.1 State 3 major classes of RNA with their functions. (30 marks)
- 4.2 Outline the sequence of reactions involved in synthesis of purine nucleotides. (40 marks)
- 4.3 Write a short note on metabolic defects associated with purine metabolism. (30 marks)

**QUESTION 05****(100 marks)**

- 5.1. Draw a flow chart to denote the digestion of proteins. (25 marks)
- 5.2. Denote the sequence of reactions involved in glucose alanine cycle. (25 marks)
- 5.3. Describe the regulation of urea cycle. (25 marks)
- 5.4. Write a short note on metabolic defects associated with protein metabolism. (25 marks)

**QUESTION 06****(100 marks)**

6.1. A researcher carried out an experiment to detect the effect on enzyme A and obtained the results as follows.

Substrate Concentration (mM) ( $S_o$ )	Enzyme Activity ( $1/V_o$ ) $\mu\text{mol}/\text{min}$
0.1	40.00
0.2	24.00
0.3	17.00
0.4	15.00
0.5	13.00

6.1.1. Calculate  $1/S_o$  substrate concentration values. (10 marks)

6.1.2. Plot the Lineweaver-Burk plot for the above data. (20 marks)

6.1.2. Calculate  $K_m$  and  $V_{max}$  for the enzyme A. (20 marks)

6.2. Compare and contrast between the three types of enzyme inhibitions using Lineweaver burk plots. (25 marks)

6.3. Discuss the importance of enzyme regulation providing examples. (25 marks)



**Faculty of Health Sciences**  
**Higher Diploma in Biomedical Sciences**  
**HD 1243 – Fundamentals of Genetics**  
**Batch – 01**  
**1<sup>st</sup> Year 2<sup>nd</sup> Semester**  
**End semester SEQ Examination**

**INDEX NUMBER:** .....

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**Date** : 01<sup>st</sup> of April 2022  
**Time** : 9.00 am. – 12.00 pm (Three Hours)

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**INSTRUCTIONS TO CANDIDATES**

- This question paper consists of **SIX** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink.
- You are not allowed to take out the examination papers.



**QUESTION 01**

**(100 marks)**

- 1.1. Metabolism of a drug vary from person to person and can change the therapeutic efficacy of a drug. Explain your answer taking CYP2C9 and warfarin as examples. (40 marks)
- 1.2. Describe how pharmacogenetic testing is helpful in practicing personalized medicine. (40 marks)
- 1.3. What is the common genetic polymorphism type seen in pharmacogenetic studies? (10 marks)
- 1.4. List two drugs which inhibit the hepatic metabolizing enzyme. (10 marks)

**QUESTION 02**

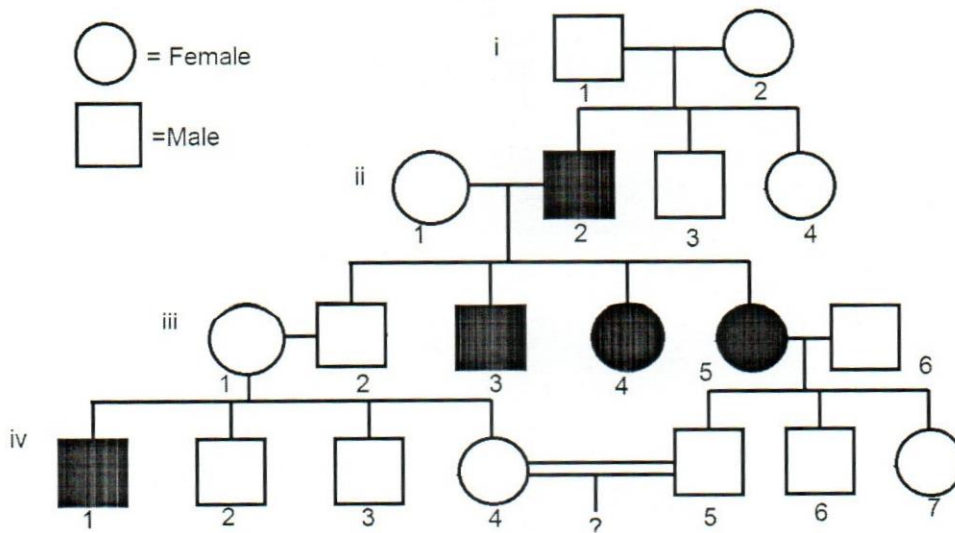
**(100 marks)**

- 2.1. Discuss on the importance of using model organisms for genetic studies. (30 marks)
- 2.2. Write a short note on classification of chromosomes. (30 marks)
- 2.3. Compare and contrast between lamp brush and giant chromosome types. (20 marks)
- 2.4. Write an account on applications of genetics. (20 marks)

**QUESTION 03**

**(100 marks)**

3.1. Answer the following questions referring to the given pedigree chart.



- 3.1.1. Identify the pedigree type by providing reasons. (30 marks)
- 3.1.2. Mention the genotypes of the affected individuals. (20 marks)

3.1.3. Discuss the probability of the 4<sup>th</sup> & 5<sup>th</sup> individuals of generation IV having a child with the trait. (20 marks)

3.2. Write a short note on chromosomal aberrations. (30 marks)

**QUESTION 04 (100 marks)**

4.1. Describe the coupling and repulsion hypothesis of genetic linkage using a diagram. (25 marks)

4.2. Discuss on the significance of genetic linkage. (20 marks)

4.3. State five factors responsible for phenotypic variation. (25 marks)

4.4. Explain the bottle neck effect. (30 marks)

**QUESTION 05 (100 marks)**

5.1 If a mother with sickle cell anemia and a father with sickle cell anemia trait (carrier) have children, calculate the percentages of the offspring with different phenotypes using Punnett square. (35 marks)

5.2 ABO blood type in humans is determined by three alleles: I<sup>A</sup>, I<sup>B</sup>, i.

5.2.1 What are the possible genotypes for blood group A? (20 marks)

5.2.2 What are the alleles that shows co-dominance? (20 marks)

5.3 A mother of a child with blood type O has blood type A. Discuss the possible genotypes and phenotypes of the father. (25 marks)

**QUESTION 06 (100 marks)**

6.1 Describe the importance of pre-natal testing. (30 marks)

6.2 List two invasive and non-invasive pre-natal diagnostic tests. (20 marks)

6.3 Recently married 40-year-old female and 42-year-old male partners came to the genetic clinic for counseling for planning their pregnancy.

6.3.1 List the steps you would engage with this couple during Genetic counseling session. (20 marks)

6.3.2 State two types of Genetic counseling. (05 marks)

6.3.3 Briefly state the code of ethics in genetic counseling. (15 marks)

6.3.4 List the goals of genetic counseling in this couple. (10 marks)



**Faculty of Health Sciences**  
**Higher Diploma in Biomedical Sciences**  
**HD 1253 Instrumentation**  
**Batch 01**  
**1<sup>st</sup> year 2<sup>nd</sup> Semester**  
**End Semester SEQ Examination**

INDEX NUMBER: .....

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**Date: 4<sup>th</sup> April 2022**

**Time: from 9.00 am to 12.00 pm**

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**INSTRUCTIONS TO CANDIDATES**

- This question paper consists of **SIX** questions.
- Answer **all** questions.
- You should write legibly in black or blue ink.
- You are not allowed to take out the examination paper

### Question 01

- 1.1. Identify two differences between Watch glass and Petri dish. (10 marks)
- 1.2. Name three (03) instruments used for heating chemical substances in the laboratory. (15 marks)
- 1.3. Name three (03) pieces of glassware used for heating liquids. (15 marks)
- 1.4. Write four (04) volumetric glass wares which are used to measure and dispense known volumes of liquids in the laboratory. (20 marks)
- 1.5. Describe the basic steps of the cleaning of glassware. (40 marks)

### Question 02

- 2.1. Mention two sterilization instruments used in microbiology laboratory. (10 marks)
- 2.2. When there is an increased concentration of infectious agents in a laboratory, certain biosafety level practices are needed. Therefore, biological safety cabinets (BSCs) are designed to protect the operator, the laboratory environment and work materials from exposure to infectious aerosols and splashes. Mention biosafety cabinet types and their protection types. (40 marks)
- 2.3. Describe care and maintenance of microscopes. (50 marks)

### Question 03

- 3.1. A modern Chemistry laboratory should be furnished with the different types of equipment. Describe in detail about all equipment and their uses found in this modern molecular biology laboratory. (100 marks)

### Question 04

- 4.1. Define the automated instruments. (20 marks)
- 4.2. List the fully automated equipment found in Biochemistry Laboratory, Haematology Laboratory and Microbiology Laboratory. (30 marks)
- 4.3. Describe the applications of above mentioned instrument in Haematology laboratory. (50 marks)

### Question 05

- 5.1. Mention the six laboratory freeze dryers (10 marks)
- 5.2. Describe applications of Laboratory Freeze Drying (40 marks)
- 5.3. Describe the applications of Spectrophotometer (50 marks)

### Question 06

- 6.1. Write short note about following instruments
- 6.1.1. Conventional PCR Machine (25 marks)
- 6.1.2. Flame Photometry (25 marks)
- 6.1.3. Liquid Chromatography (25 marks)
- 6.1.4. Gas Chromatography (25 marks)