

2011+2010



## MOI UNIVERSITY

OFFICE OF THE CHIEF ACADEMIC OFFICER

UNIVERSITY EXAMINATIONS  
2010/2011 ACADEMIC YEAR

SECOND YEAR END OF YEAR EXAMINATIONS (EYE)

BACHELOR OF MEDICINE  
AND  
BACHELOR OF SURGERY

COURSE CODE: MBC 200

COURSE TITLE: MEDICAL BIOCHEMISTRY

DATE: 27<sup>TH</sup> SEPTEMBER, 2011 TIME: 9.00 A.M. - 12.00 NOON

INSTRUCTION TO CANDIDATES

SEE INSIDE.

THIS PAPER CONSISTS OF (8) PRINTED PAGES

PLEASE TURN OVER

## MOI UNIVERSITY

SCHOOL OF MEDICINE  
END OF YEAR EXAMINATION (EYE) 2010/2011  
COURSE CODE: MBC 200COURSE TITLE: MEDICAL BIOCHEMISTRY  
PROGRAMME: M.B.Ch.B., BDS YEAR OF STUDY: 2(TWO)  
DATE: 27<sup>TH</sup> SEPTEMBER, 2011 TIME: 9.00 A.M. - 12.00 NOON

## GENERAL INSTRUCTIONS:-

- Write your University Registration Number on every piece of paper you use.
- Do not write your name(s) on any piece of paper you use.
- This paper consists of twenty (20) Multiple Choice Questions (MCQs) to be answered in sixty (60) minutes; six (6) Short Answer Questions (SAQs) to be answered in sixty (60) minutes and three (3) Long Essay Questions (LEQs) to be answered in sixty (60) minutes.
- The questions are set out in three (3) sections headed section I: MCQs, section II: SAQs and section III: LEQs
- Read carefully the additional instructions preceding each section.

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SECTION I: MULTIPLE CHOICE QUESTIONS (MCQs)  
TYPE III (20 Minutes)

## INSTRUCTIONS

- EACH OF THE QUESTIONS IN THIS SUBSECTION CONSISTS OF A STATEMENT WHOSE MOST APPROPRIATE ANSWER IS PROVIDED AMONG THE FIVE OPTIONS NUMBERED (a) - (e).
  - FOR EACH QUESTION, SELECT THE MOST APPROPRIATE OPTION AND INDICATE BY PRINTING AN X IN THE BOX IN THE ANSWER SHEET PROVIDED.
- Which of the following metabolic pathways is mainly responsible for the control of glucose levels in blood?
    - Glycolysis
    - Pentose phosphate pathway
    - Gluconeogenesis + glycogenesis
    - Glycogen synthesis
    - Fatty acid degradation
  - Which enzyme catalyses formation of acetylsulfanilamide conjugate
    - Acetyl transpeptidase
    - Sulfanilamide peptidase
    - Sulfanilamide transferase
    - S-Acetyltransferase
    - N-Acetyltransferase
  - In which of the following sites of the liver are ketone bodies formed
    - Endoplasmic reticulum
    - Mitochondria
    - Lysosome
    - Cytosol
    - Plasma membrane

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- Which of the following enzymes catalyzes the conversion of Glucose-6-phosphate to Glucose-1-phosphate
  - Phosphofructokinase
  - Glucokinase
  - Hexokinase
  - Phosphoglucomutase
  - Phosphohexose isomerase Glucose-6-phosphate → Fructose-6-phosphate
- Which of the following plays a role in regulation of glycogen metabolism
  - Glycogen synthase
  - Glycogen phosphorylase
  - Epinephrine
  - cAMP
  - Glucagon
- Which of the following hexose monophosphate pathway is important in nucleotide biosynthesis
  - Ribulose-5-phosphate
  - Xylulose-5-phosphate
  - Ribose-5-phosphate
  - Erythrose-4-phosphate
  - Phosphoglucomutase
- Which ONE of the following enzymes of the TCA cycle is directly linked to the electron transfer chain
  - Malate Dehydrogenase Malate + NAD<sup>+</sup> → Oxaloacetate + NADH
  - Acyl-CoA dehydrogenase
  - Fumarate dehydrogenase
  - Fumarate dehydrogenase
  - $\alpha$ -ketoglutarate dehydrogenase
- Which of the following enzymes is found in both glycogen synthesis and degradation of glycogen
  - Hexokinase
  - Glucose-6-phosphatase
  - Phosphoglucomutase
  - Glycogen synthase
  - Phosphorylase

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- The oxidation of pyruvate to acetyl-CoA requires all of the following except
- Thiamine
  - FAD
  - NAD<sup>+</sup>
  - Coenzyme A
  - FADH<sub>2</sub>
9. Ribulose-5-epimerase converts ribulose-5-phosphate to?
- Xylulose-5-phosphate
  - Fructose-6-phosphate
  - Xylose-5-phosphate
  - Ribose-5-phosphate
  - Arabinose-5-phosphate
10. Color vision involves all of the following except
- 11-Cis retinal amine
  - Serpentine transmembrane proteins
  - Cone cells only
  - Both the rods and the cones
  - Three different photoreceptors cells
11. The standard free energy of hydrolysis of glucose-1-PO<sub>4</sub> at pH 7
- 3.3 kcal/mol -  $GTP \rightarrow GTP + P_i$
  - 2.2 kcal/mol -  $ATP \rightarrow ADP + P_i$
  - 3.8 kcal/mol -  $Fructose-6-P_2 \rightarrow Fructose-6-P_1 + P_i$
  - 4.8 kcal/mol
  - 5.0 kcal/mol
12. Which of the following factors contributes to the high energy transfer potential of ATP
- Greater resonance stabilization of ADP is P<sub>i</sub> than ATP
  - Increase in electrostatic repulsion of oxygen upon hydrolysis of ATP
  - Interaction of terminal phosphoryl group with ribose group in ADP
  - Stabilization of products by tautomerization
  - Stabilization of the reactant by ionization

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14. Which ONE of the following does not increase urate levels in the body
- Cancer drugs
  - Vitamin B12
  - Thiazides
  - Aspirin
  - Ascorbate
15. The cut-off point for a healthy uric acid level in the blood is
- 6.8 mg/ml \*  $10 \mu\text{mol} = 1 \mu\text{L}$
  - 10.1 mg/ml  $2.5 - 7.2$
  - 9.5 mg/ml
  - 20.8 mg/ml
  - 10 mg/ml
16. Which crystals are deposited in joints and soft tissues during gout
- Sodium urate
  - Potassium urate
  - Monosodium urate
  - Iodine
  - Calcium urate
17. Which of the following metabolic pathways does not require NADPH?
- Ketone body synthesis ✓
  - Fatty acid biosynthesis ✓
  - Cholesterol biosynthesis ✓
  - Tyrosine biosynthesis ✓  $\text{from phenylalanine}$
  - Sphingosine biosynthesis ✓
18. Which of the following tissues converts pyruvate to lactate most effectively?
- Liver
  - Adipose tissue
  - Muscle
  - Brain
  - Kidney

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19. Biosynthesis of fatty acids requires all of the following except:
- NADPH
  - ATP
  - Mn<sup>2+</sup>
  - Mg<sup>2+</sup>
  - HCO<sub>3</sub><sup>-</sup>; O<sub>2</sub>
20. One of the following is not involved during the synthesis of sphingosine
- Ceramide
  - Sphingosine
  - Serine
  - 3-ketosphingosine  $\text{from sphingosine}$
  - Palmitoyl-CoA

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SECTION II: SHORT ANSWER QUESTIONS (SAQs)  
(60 minutes)(10 minutes each)

## INSTRUCTIONS:-

- THERE ARE SIX (6) QUESTIONS IN THIS SECTION
- ANSWER ALL THE SIX (6) QUESTIONS.
- START EACH QUESTION ON A FRESH PAGE OF THE BOOKLET

- 2011-2012
- SAQ 1. Describe the oxidation of pyruvate to acetyl CoA.
- SAQ 2. Describe the conversion of glucose to glycogen.
- SAQ 3. Describe the process of glycogenolysis.
- SAQ 4. Give an outline of the composition of the various complexes of the electron transport chain.
- SAQ 5. Describe the oxidative non-reversible phase of the hexose monophosphate pathway.
- SAQ 6. Describe using chemical structures the oxidation of ketone bodies.

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## SECTION III - LONG ESSAY QUESTIONS (LEQs) (60 minutes)

INSTRUCTION:

- I) THERE ARE FIVE (5) QUESTIONS IN THIS SECTION.
- II) ANSWER ALL THE FIVE (5) QUESTIONS
- III) START EACH QUESTION ON A FRESH PAGE OF THE BOOKLET.

- 2011 - 2012
- LEQ 1. Outline the reactions of urea cycle giving all the enzymes involved and the significance of the pathway.
- LEQ 2. Describe using biochemical structures the pathway for aldosterone synthesis.
- LEQ 3. Describe briefly with the help of schematic diagram the stages of fuel extraction from polysaccharides, lipids and protein.
- LEQ 4. Outline the biosynthetic steps of glycosphingolipids and gangliosides from palmitoyl-CoA and serine.
- LEQ 5. Outline the reaction pathways for the synthesis of purines from ATP and ribose-5-phosphate.