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SARDAR PATEL UNIVERSITY

M. Sc. Semester- I (Under CBCS) Examination – BIOCHEMISTRY

Friday, 24th April 2015

Time- 10:30am to 1:30pm

PS01CBIC03 Cellular Metabolism

Marks: 70

Q.1 **Select the most correct answer from the following:** **[08]**

1. Which of the following molecule oxidizes most rapidly in a cell?
   a. Carbohydrate **c.** Protein
   b. Lipid **d.** DNA

2. Which of the following enzymes in glycolysis catalyzes a reaction that is essentially irreversible?
   a. Enolase **c.** Triose phosphate isomerase
   b. Phosphofructokinase **d.** Phosphohexose isomerase

3. During prolonged fasting conditions, which enzyme of glycolysis is inhibited by free fatty acids?
   a. Glucokinase **c.** Fructose 1,6,bisphosphatase
   b. Pyruvate kinase **d.** Phosphofructokinase

4. Which of the following fatty acids cannot be synthesized in mammals?
   a. α – linolenic acid **c.** Oleic acid
   b. Linoleic acid **d.** Both (a) and (b)

5. Chorismate is a key intermediate in the synthesis of-
   a. isoleucine, tyrosine, phenylalanine **c.** tryptophan, tyrosine, phenylalanine
   b. leucine, isoleucine, tyrosine **d.** phenylalanine, tyrosine, leucine

6. The first step in nitrogen cycle is-
   a. Hydrolysis of atmospheric nitrogen **c.** Oxidation of atmospheric nitrogen
   b. Reduction of atmospheric nitrogen **d.** None of the above

7. Purine nucleotide biosynthesis is regulated by-
   a. ATP, IMP, GMP **c.** AMP, GMP, IMP
   b. AMP, CMP, GMP **d.** AMP, TMP, CMP

8. Alkaptonuria is a disorder due to deficiency of enzyme-
   a. Homogentisate oxidase **c.** Phenylalanine 4 monooxygenase
   b. Tyrosine 3 monooxygenase **d.** Dihydroorotase

Q.2 **Answer the following questions. (ANY SEVEN OUT OF NINE)** [14]

1. Enlist all essential amino acids.
2. Differentiate between hexokinase and glucokinase.
3. What are anaploretic reactions? Give examples.
4. What are inhibitors and uncouplers? Give examples.
5. Name any four unsaturated fatty acids.
6. Distinguish between De-Novo and salvage pathway.
7. Why is gluconeogenesis expensive?
8. Explain: The free energy change for ATP hydrolysis is large and negative.
9. Differentiate between glucogenic and ketogenic amino acids.

Q.3 **a.** Explain the reactions involved in Q-cycle. [06]

b. Describe the chemiosmotic model when proton gradient transformed into ATP. [06]

OR

b. Explain the structure, function and mechanism of ATP synthase. [06]

Q.4 **a.** Explain the various fate of Glucose-6-phosphate in a cell. [06]

b. Describe the coordinated regulation of Glycolysis and Gluconeogenesis. [06]

OR

b. Explain the role of TCA cycle in intermediary metabolism. [06]

Q.5 **a.** How do AcetylCoA produced in mitochondria come to cytosol for fatty acid biosynthesis? [06]

b. Explain the oxidation of Palmitoyl -CoA with its energy production by β-oxidation. [06]

OR

b. Explain the regulation of fatty acid biosynthesis. [06]

Q.6 **a.** Explain transanimation reactions in detail. [06]

b. Write the steps for De-Novo synthesis of pyrimidine nucleotide. [06]

OR

b. Write the biosynthesis of chorismate and explain the biosynthesis of essential amino acids from the chorismate. [06]

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SARDAR PATEL UNIVERSITY

M.Sc (II SEMESTER) EXAMINATIONS (BIOCHEMISTRY)

21st April (Tuesday) 2015

Time: 2.30 to 5.30 p.m

Paper: PS02CBIC01- Molecular Biology

Total marks: 70

I. Choose the most appropriate answer **(8x1 = 8)**

i) The time required for the complete denaturation of DNA will be determined by which of the following factor?

a. Temperature c. Length of the DNA

b. GC content d. All of the above.

ii) Formation of Okazaki fragments takes place on

a. Lagging strand c. Both strands

b. Leading strand d. None.

iii) The σ-factor will bind to which of the following sequences?

a. Operators c. Promoters

b. Enhancers d. Silencers.

iv) Pseudouridine, a modified base is found in

a. mRNA b) 16S rRNA c) 23S rRNA d) tRNA

v) The primer of the lagging strand during DNA replication is removed by

a. 3'5'exonuclease activity of DNA polymeraseIII

b. DNA primase

c. 3'5'exonuclease activity of DNA polymerase I

d. 5'3'exonuclease activity of DNA polymerase I

vi) Which of the following amino acids would be able to restore the attenuation control of trp operon?

a. Tryptophan alone c. arginine alone

b. Tryptophan and arginine d. None of these

vii) Shine-Dalgarno sequence found in the prokaryotic mRNAs facilitates ribosome binding by interaction with the 3'end of

a. 23S rRNA b. 16S rRNA c. 18S rRNA d. 5S rRNA

viii) Requirements for eukaryotic protein synthesis include all of the following except

a. mRNA b. GTP c. F-Met-tRNA d. Ribosomes

II. Answer in brief (any seven) **(7x2 = 14)**

a) What is Tm?
b) What are Inteins?
c) Position and role of Histone H1.
d) Differentiate: Monocistronic and Polycistronic RNA.
e) Conserved sequences of *Ori*C
f) Differentiate: cis acting and trans acting elements
g) Promoter clearance
h) Role of aminoacyl tRNA synthetase in protein synthesis
i) Homeotic genes of Drosophila

II. ANSWER THE FOLLOWING **(4X12 = 48)**

1. a) Write a note on control of DNA replication in prokaryotes.
   b) Describe mismatch repair of DNA in prokaryotes..

   OR

   b) What are histones? Explain packaging of chromosomes in eukaryotes.

2. a) Explain the role of telomerase in solving the end-replication problem in eukaryotes.
   b) Write a note on initiation of transcription in prokaryotes.

   OR

   b) Explain the interaction between Sigma factor and DNA in detail.

3. a) Explain intron splicing in eukaryotic mRNAs in detail

   b) Describe the mechanism by which regulatory proteins recognize and bind specific sequences of DNA?

   OR

   b) Outline the structure of tRNA with a note on the role of modified bases in tRNA function.

4. a) Explain the formation of preinitiation complex during translation in eukaryotes
   b)What is attenuation? Explain *trp* operon in detail.

   OR

   b) What are maternal genes? Explain their role in establishment of polarity in drosophila.

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