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SARDAR PATEL UNIVERSITY
M. Sc. BIOCHEMISTRY (I Semester) (NC) Examination
Paper: PS01CBIC01 (Cell Biology and Genetics)

Tuesday, 11th April 2017
Time: 10.00 a.m. to 1.00 p.m.

Total Marks: 70

- N.B.:** (i) Answers of all the questions (including multiple choice questions) should be written in the provided answer book only.
(ii) Figures in the right indicate marks.

Q1. Choose the most appropriate answer for the following multiple choice questions: (8)

- (i) Which of the following clues would tell you whether a cell is prokaryotic or eukaryotic?
(a) the presence or absence of a rigid cell wall
(b) whether or not the cell is partitioned by internal membranes
(c) the presence or absence of ribosomes
(d) whether or not the cell carries out cellular metabolism
- (ii) Assuming all other factors to be the same, electron microscopes have greater resolving power than light microscopes because,
(a) the wavelength of electrons is much longer than the wavelength of visible light
(b) because the beams in electron microscopes overlap creating a clearer picture
(c) because the wavelengths in visible light are longer than with electron
(d) because electron microscopes are compound microscopes
- (iii) The Golgi apparatus is involved in
(a) transporting proteins that are to be released from the cell
(b) packaging proteins into vesicles
(c) altering or modifying proteins
(d) all of the above
- (iv) Mitochondria and chloroplasts share several common features, for example,
(a) both are capable of semiautonomous growth and reproduction.
(b) neither are components of the endomembrane system.
(c) each contains a small amount of DNA
(d) all of the above
- (v) If a group of normal people produces 312 normal and 103 albino offspring, what could be genotype of parents?
(a) AA x aa (b) Aa x AA (c) aa x aa (d) Aa x Aa
- (vi) Which structure of a cell is responsible for moving of chromosomes during mitosis?
(a) Nucleolus (b) nuclear membrane (c) spindle (d) cytoplasm
- (vii) During which phase of meiosis, do chromatids separate completely?
(a) Metaphase I (b) Anaphase I (c) Telophase II (d) Anaphase II
- (viii) An allele is
(a) Another word for gene (c) a homozygous genotype
(b) A heterozygous genotype (d) one of several possible forms of gene

(Contd.....2)

Q2. Answer any SEVEN of the following questions briefly:

(7 X 2 = 14)

- (i) Some of the eukaryotic organelles evolved through a symbiotic relationship? Explain.
- (ii) Comment upon "Endomembrane system divides cell into compartments where different cellular functions occur".
- (iii) Differentiate between phagocytosis and pinocytosis.
- (iv) Comment upon the importance of microscopy in the organizational studies of cell
- (v) Which cell organelle can store water, sugars, ions and pigments?
- (vi) In prokaryotic cells, which do not contain cell membrane, how ATP is synthesized?
- (vii) What happens in G1 phase of the cell cycle?
- (viii) Define apoptosis.
- (ix) Define phenotype and genotype.

Q3. (a) Presenting the most widely accepted model of structure of cell membrane, outline the main mechanisms by which material is transported across the cell membrane. **(6)**

(b) Giving an illustrative account of structure of nucleus, discuss the cytoplasmic and nucleoplasmic interaction with an emphasis of how a single nuclear pore complex can efficiently transport proteins that possess different kinds of nuclear localization signal. **(6)**

OR

(b) Discuss that "different components of photosynthetic apparatus are localized in different areas of the grana and the stroma lamellae" and justify "chloroplasts are semi-autonomous organelles". **(6)**

Q4. (a) With suitable illustrations, give an overview of the structure of Golgi complex and discuss its functional relationship. **(6)**

(b) Giving an overview of the composition and organization of cytoskeletal elements, discuss in brief their role in cell division, wall formation and transport **(6)**

OR

(b) Explain the molecular events that take place during cell cycle and discuss the mechanism/s of regulation of cell cycle. **(6)**

Q.5 (a) Explain in detail the activation of cyclin dependent kinase. Also give its function. **(6)**

(b) Explain the cell cycle check points that regulates the cell division. **(6)**

OR

(b) Define/explain the following terms: **(6)**

(i) dihybrid ratio (ii) isoallele (iii) co-dominance

Q.6 (a) Write the two Mendel's laws and deviations of these laws. **(6)**

(b) Give examples and explain the concept of multiple allelism. **(6)**

OR

(b) A man with Type O blood marries a woman with heterozygous Type A blood. What are the possible phenotypes of the children. **(6)**

SARDAR PATEL UNIVERSITY
M. Sc. (I Semester) Biochemistry (under CBCS) Examination
Monday, 17th April 2017
Time: 10.00 am to 1.00 p.m.
Paper: PS01CBIC03 (Cellular Metabolism)

Total Marks: 70

- N.B.: (i) Answers of all the questions (including multiple choice questions) should be written in the provided answer book only.
(ii) Figures in the right indicate marks.

Q1. Choose the most appropriate answer for the following multiple choice questions: (8)

- (i) Which of the following cells/tissues prefer anaerobic glycolysis?
(a) RBCs (c) exercising muscles
(b) cancer cells (d) all of the above
- (ii) What are the tissues in which pentose phosphate pathway is significant?
(a) Liver (c) Adipose tissue
(b) Ovary (d) All of the above
- (iii) Which of the following are products of β oxidation of odd chain fatty acids?
(a) Acetyl coA (c) malonyl coA
(b) Acetyl coA and propionyl CoA (d) all of the above
- (iv) Acetyl-CoA is produced from
(a) Pyruvate (c) leucine
(b) fatty acids (d) all of the above
- (v) Which TCA cycle intermediate can be formed from aspartic acid?
(a) citric acid (c) oxalic acid
(b) α -ketoglutarate (d) none of the above
- (vi) Which of the following is increased in blood during starvation?
(a) ketone bodies (c) glucagon
(b) epinephrine (d) All of the above
- (vii) The precursor to glycogen in the glycogen synthase reaction is
(a) Glucose 1- phosphate (c) Glucose -6- phosphate
(b) UDP-glucose (d) None of the above
- (viii) Glutamine is synthesized in the liver by the action of enzyme
(a) Transaminase (c) α - ketoglutarate dehydrogenase
(b) Glutamine synthetase (d) none of the above

(Contd.....2)

Q2. Answer any SEVEN of the following questions briefly:

(7 X 2 = 14 Marks)

- (i) Which enzyme of HMP shunt generates NADPH?
- (ii) Why muscle glycogen cannot serve as a precursor to blood glucose?
- (iii) Differentiate between the Hexokinase and Glucokinase.
- (iv) Which aminoacids are both ketogenic and glucogenic?
- (v) How fatty acids are activated for oxidation?
- (vi) What are essential fatty acids? Give examples.
- (vii) Differentiate between free energy change and standard free energy change.
- (viii) An amino acid that yields acetoacetyl-CoA during catabolism is glucogenic or ketogenic?
- (ix) Name the amino acid sequence of peptide MDEQCTWYRG

Q3. (a) Explain how catabolic reactions are coupled with anabolic reactions in metabolism. (6)

- (b) Explain the different fates of pyruvate in the cell. Also explain the conditions during which these reactions are preferred. (6)

OR

- (b) Explain the reactions and importance of gluconeogenesis. (6)

Q4. (a) What are the locations and reactions of different carriers involved in electron transport chain? (6)

- (b) Explain the mechanism of action of ATP synthetase in detail. (6)

OR

- (b) Explain the coordinated regulation of glycolysis and TCA cycle. (6)

Q 5. (a) Why small chain and medium chain fatty acids are easily oxidized compared to long chain fatty acids? Explain the role of carnitine in fatty acid transport. (6)

- (b) Explain the oxidation of Palmitoyl-coA and calculate the energy production by β - oxidation. (6)

OR

- (b) What are ketone bodies? Under which physiological conditions are they produced? (6)

Q .6 (a) Explain the urea cycle and discuss its significance. (6)

- (b) Write a detailed note on regulation of purine biosynthesis. (6)

OR

- (b) Explain - intermediary reactions of carbohydrate and fat metabolism. (6)

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