

SEAT No. \_\_\_\_\_

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[34] SARDAR PATEL UNIVERSITY  
M.Sc. (I Semester- CBCS) Examination  
Subject: BIOTECHNOLOGY  
PS01CBIT03; Cell Biology & Genetics  
Monday, April 17, 2017  
Time: 10.00 a.m. to 1.00 p.m.

Total Marks: 70

Note: Figures in brackets indicate marks  
Answer all the questions in the given answer book

Q1. Choose the appropriate answer for the following multiple choice questions: (8x1=8)

- i) Which of the following is not a characteristic of prokaryotes?  
(a) DNA (b) cell membrane  
(c) cell wall (d) endoplasmic reticulum
- ii) Which of the following statements does not apply to the nuclear envelope?  
(a) It is a double membrane.  
(b) It has pores through which material enters and leaves.  
(c) It is continuous with the endoplasmic reticulum.  
(d) It has infoldings to form cristae.
- iii) Proteins synthesized by the rough ER are  
(a) for internal storage (b) to build more membranes in the cell  
(c) exported from the cell (d) for internal regulation
- iv) Of the following organelles, which group is involved in manufacturing substances needed by the cell?  
(a) lysosome, vacuole, ribosome (b) ribosome, rough ER, smooth ER  
(c) vacuole, rough ER, smooth ER (d) smooth ER, ribosome, vacuole
- v) Enzymes of  $\beta$ - oxidation of fatty acids to acetyl coenzyme A are located in which cellular organelle?  
(a) Ribosomes (b) Glyoxysomes  
(c) Golgi body (d) Nucleus
- vi) The phenotypic and genotypic ratio appears as \_\_\_\_\_ in which interaction of the genes.  
(a) 1:2:1; Incomplete dominance (b) 1:2:1; Complete dominance  
(c) 3:1; co-dominance (d) 3:1; incomplete dominance
- vii) The process in which a part of a chromosome becomes detached and joins a part of a nonhomologous chromosome is called:  
(a) Deletion (b) addition  
(c) Inversion (d) translocation
- viii) Transposable elements move from one position to another in genome and responsible for ----- and -----.  
(a) Mutations, Chromosome breakage  
(b) Chromosome addition, inversion  
(c) Variation, ploidy  
(d) Mutation, chromosome structure

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- Q2. Answer any SEVEN of the following in brief: (7x2=14)
- (a) 'Some of the eukaryotic organelles evolved through a symbiotic relationship'. Explain.
  - (b) How the inventions of Phase-Contrast microscope and Electron microscope have helped the development of Cell Biology?
  - (c) Compare and contrast facilitated diffusion with active transport.
  - (d) Explain the events take place during G<sub>1</sub> phase of cell cycle?
  - (e) Differentiate between phagocytosis and pinocytosis.
  - (f) Write importance of meiosis in Genetics
  - (g) Write a brief note on lethal genes
  - (h) Explain the terms segregation, monohybrid cross
  - (i) Explain in brief importance of crossing over in genetics
- Q3. (a) Giving an illustrative account of structure of nucleus, explain how a single nuclear pore complex can efficiently transport proteins that possess different kinds of nuclear localization signal. (6)
- (b) Giving an over view of structure of plasma membrane and briefly discuss the types of membrane proteins and their functions (6)
- OR
- (b) Based on Noviloff's GERL theory, briefly explain the origin of lysosomes and discuss the role of secondary lysosomes in the cellular digestive processes. (6)
- Q4 (a) Write an explanatory note on the chloroplast structure and its functional relationship (6)
- (b) Giving an account of Cell Cycle Checkpoints, discuss the mechanism/s of regulation of cell cycle. (6)
- OR
- (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)
- Q5 (a) Give a brief account of the structure and functional relationship of Golgi complex (6)
- (b) What is epistasis? Write a note on epistasis with any two suitable examples. (6)
- OR
- (b) Write a note on Pedigree analysis in the transmission of traits in humans. (6)
- Q6 (a) Discuss the experiments conducted by Morgan to explain the sex linked inheritance. (6)
- (b) Write notes on crossing over and its importance in transmission of traits (6)
- OR
- (b) Write notes on cytoplasmic inheritance with any two suitable examples (6)

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SEAT No. \_\_\_\_\_

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**SARDARPATEL UNIVERSITY**  
**M. Sc. (I Semester) (under CBCS) Examination**  
**Wednesday, 19<sup>th</sup> April 2017**  
**Time: 10.00 a.m. to 1.00 p.m.**  
**Paper: PS01EBIT01 (Biochemistry)**

**Total Marks: 70**

Q1. Give the correct answers for the following questions: (08)

- Phosphoglycerate kinase in glycolysis produces ATP via
  - Oxidative phosphorylation
  - Substrate level phosphorylation
  - Oxidative decarboxylation
  - Phosphorylation
- When pyruvate is not converted into acetyl-CoA?
  - All the time
  - In anaerobic conditions
  - When oxygen is plentiful & energy is required
  - When glucose is in excess
- Citrate is broken down into cell cytosol to Acetyl-coA and oxaloacetate by
  - Citrate hydratase
  - Citrate is not broken down in cytosol
  - Citrate lyase
  - Citratase
- In the reversible reaction  $A \rightarrow B$ , in which direction reaction will proceed if the concentration of A is increased?
  - Depends on std. free energy
  - forward
  - depends on free energy
  - reverse
- Glycolysis proceeds fastest in
  - myocyte
  - cardiac cells
  - a starved cell
  - cancerous cells
- Prediction of secondary structure of proteins by Ramchandran plot is on the basis of rotation around
  - Peptide bond
  - Phi & Psi bonds
  - disulphide bonds
  - weak bonds
- Biosynthesis of ketone bodies is favoured in cells under \_\_\_\_\_ conditions.
  - hypoglycemic
  - diabetic
  - starvation
  - all of the above
- Glutamine is synthesized in the liver by the action of enzyme
  - Transaminase
  - Glutamine synthetase
  - $\alpha$ -ketoglutarate dehydrogenase
  - none of the above

Q.2 Answer **any seven** of the following questions briefly: (14)

1. Which biomolecule is the major source of energy for hepatocytes during normal metabolism? Why?
2. Differentiate between PFK-1 and PFK-2.
3. Why is the TCA cycle the central pathway of metabolism of the cell?
4. Briefly explain regulation of  $\beta$ -oxidation.
5. What are essential fatty acids? Give examples.
6. Differentiate between Glycogen synthase and Glycogen phosphorylase
7. In which tissue/s does the malate-aspartate shuttle operate?
8. Why glutamate, and glutamine are found in higher concentration in blood compared to other amino acids?
9. An amino acid that yields acetoacetyl-CoA during catabolism is glucogenic or ketogenic?

Q.3 (a) Explain: Biological energy transformations obey the laws of thermodynamics. (06)  
(b) What are redox reactions? List various types of redox reactions occurring in a cell. (06)

OR

Q.3 (b) Explain the mechanism of action of ATP synthase in detail. (06)

Q.4 (a) Explain the reactions of citric acid cycle. Can this cycle occur in absence of oxygen? (06)  
(b) Explain the site, reactions and importance of pentose phosphate pathway (PPP). (06)

OR

Q.4 (b) Explain the major regulatory enzymes of glycolysis. (06)

Q.5 (a) Explain the  $\beta$ -oxidation of even and odd chain of fatty acids. (06)  
(b) Explain the fatty acid synthase complex structure. (06)

OR

Q.5 (b) Explain the reactions of ketone body formation. Under which physiological conditions ketone bodies are produced? (06)

Q.6 (a) Give examples and explain transamination reactions. (06)  
(b) Explain the regulation of purine nucleotide biosynthesis. (06)

OR

Q.6 (b) Explain the role of TCA cycle in intermediary metabolism. (06)