

(19)

SARDAR PATEL UNIVERSITY

M. Sc. (I Semester) BIOCHEMISTRY (under CBCS) Examination

Saturday, 18th April 2015

Time: 10.30 a.m. to 1.30 p.m.

Paper: PS01CBIC01 (Cell Biology & Genetics)

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) Differences between eukaryotic and prokaryotic cells include all of the following except

- (a) eukaryotic cells have mitochondria
- (b) eukaryotic cells have cilia and flagella with complex structure
- (c) prokaryotic cells have more complex cell walls
- (d) prokaryotic cells have no genetic material

(ii) The function of the nucleolus in the cell is:

- (a) Biogenesis of ribosomes; synthesis of RNA protein
- (b) Synthesis of DNA
- (c) Synthesis of ribosomes
- (d) Synthesis of RNA

(iii) Which of the following does not apply to chloroplasts?

- (a) They contain chlorophyll and the enzymes required for photosynthesis.
- (b) They contain an internal membrane system consisting of thylakoids.
- (c) They synthesize ATP (adenosine triphosphate) from ADP (adenosine diphosphate) and Pi (inorganic phosphate).
- (d) They are bounded by two membranes, the inner of which is folded into the cristae.

(iv) Proteins synthesized by the rough ER are

- (a) for internal storage
- (b) to build more membranes in the cell
- (c) to digest food in lysosomes
- (d) exported from the cell

(v) Which one of the following eukaryotic cell structures does not contain DNA?

- (a) a nucleus
- (b) a mitochondrion
- (c) the endoplasmic reticulum
- (d) a chloroplast

(vi) Which of the following is a correct definition of genetics?

- (a) The study of transmission of traits from parent to offspring.
- (b) The study of genes and traits defined by genes.
- (c) The study of DNA.
- (d) The study of variation between members of a species.

(vii) Which blood type would not be possible for children of a type AB mother and a type A father?

- (a) O
- (b) A
- (c) B
- (d) AB

(viii) In a cross between two heterozygotes (Aa), the F₂ generation will be

- (a) in the ratio 1:3 heterozygous to homozygous
- (b) all heterozygous
- (c) in the ratio 1:1 homozygous to heterozygous
- (d) in the ratio 1:3 homozygous to heterozygous

(Contd.....2)

Q2. Answer any SEVEN of the following questions briefly: (7 X 2 = 14 Marks)

- (i) Comment upon "Endomembrane system divides cell into compartments where different cellular functions occur".
- (ii) Why is the evolution of photosynthesis thought to have favoured the subsequent evolution of oxidative metabolism?
- (iii) Differentiate between euchromatin and heterochromatin
- (iv) Explain, "The division cycle of most cells consists of four coordinated processes".
- (v) Differentiate between endocytosis and phagocytosis
- (vi) What is the function of Wee 1 and CAK?
- (vii) What is the effect of fusing cells of following types?
 - (a) Fusing a cell in G1 with a cell in S phase
 - (b) Fusing a cell in G1 with a cell in M phase
- (viii) Explain the role of condensins in cell cycle. (ix) State Mendel's two laws.

- Q3. (a)** Giving an illustrative account of structure of nucleus, briefly explain how a single nuclear pore complex can efficiently transport proteins that possess different kinds of nuclear localization signal. (6)
- (b)** With suitable illustrations discuss the main mechanisms by which material is transported across the cell membrane. (6)

OR

- (b)** Give an illustrative account of the formation of primary and secondary 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)** Give a brief account of the structure and functional relationship of Golgi complex (6)

OR

- (b)** Giving a brief over view of ribosomes, present their structure based on asymmetrical model. (6)

- Q5. (a)** Giving an overview of the composition and organization of cytoskeletal elements, discuss in brief their role in cell division, wall formation and transport. (6)
- (b)** What is meant by cell cycle check point? What is its importance? How does a cell stop its progress at one of these check points? (6)

OR

- (b)** Explain the following terms: (6)
- (i) Multiple factor hypothesis
 - (ii) Phenomenon of multiple allelism

Q.6 (a) State the law of segregation. For a following dihybrid cross write the number of possible gametes.

A tall pea plant bearing purple flowers is crossed with pure strain of similar phenotype. (for height of plant- dominant allele T; recessive allele t) (for color of flower - dominant allele P; recessive allele p) (6)

- (b)** In fruitflies the wild eye color (deep red) is dominant over the white (r). If red eyed wild female fruitfly is crossed to a white eyed male, produces 60 red eyed & 63 white eyed offsprings. When this red eyed female fruitfly was crossed to a red male, it produced all red offsprings. What must be the genotype of the three parent flies? (6)

OR

- (b)** Albinism in man is resulted due to recessive allele of tyrosinase. A group of people with an identical genotype resided on an isolated island. Over a period of 12 years they produced: 298 normal and 105 albino offsprings. What must be the genotype of the parents? (6)