



WEST BENGAL STATE UNIVERSITY

B.Sc. Honours/Programme 1st Semester Examination, 2020, held in 2021

MLBHGE01T/MLBGCOR01T-MOLECULAR BIOLOGY (GE1/DSC1)

MOLECULAR BASIS OF LIFE

Time Allotted: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.*

1. Answer any **ten** questions from the following: 1×10 =10
- A. Choose the correct option :
- (a) Majority of the monosaccharides found in the human body are of which type stereoisomer?
- (i) L type (ii) D type
(iii) Racemic mixture (iv) Neutral
- (b) Which is the simplest carbohydrate?
- (i) Glucose (ii) Ribose
(iii) Glyceraldehyde (iv) Dihydroxy acetone
- (c) The degree of unsaturation of lipid can be measured as _____
- (i) Saponification number (ii) Iodine number
(iii) Polenski number (iv) Reichert-Meissl number
- (d) Which of the following is the example of epimers?
- (i) Glucose and Mannose (ii) Glucose and Fructose
(iii) Galactose and Mannose (iv) Glucose and Ribose
- (e) Number of mg of KOH required to neutralize fatty acid present in 1g of fat is called
- (i) Potassium number (ii) Acid number
(iii) Saponification number (iv) Iodine number
- (f) Which membrane lipid contains an amide bond?
- (i) Cholesterol (ii) Phosphatidylserine
(iii) Phosphatidic acid (iv) Sphingomyelin
- (g) Resolving power of a microscope depends upon
- (i) The focal length and aperture of the eye lens
(ii) The focal length of the objective and eye lens
(iii) The apertures of objective and the eye lens
(iv) The wavelength of light illuminating the object

- (h) The lysosomes are known as 'suicidal bag' because
- (i) Parasitic activity
 - (ii) Presence of food vacuoles
 - (iii) Hydrolytic activity
 - (iv) Catalytic activity
- (i) Which of the following molecules or substances contain, or are derived from, fatty acids?
- (i) Beeswax
 - (ii) Prostaglandins
 - (iii) Sphingolipids
 - (iv) Triacylglycerols
- (j) The rough endoplasmic reticulum is involved in
- (i) Lipid synthesis
 - (ii) Protein synthesis
 - (iii) Carbohydrate synthesis
 - (iv) Cholesterol synthesis
- (k) The magnification power of a compound microscope does not depend upon
- (i) The focal length and aperture of the eye lens
 - (ii) The aperture of the object lens
 - (iii) Tube length of the microscope
 - (iv) None of the above
- (l) The fluidity of plasma membrane increases with
- (i) Increase in unsaturated fatty acids in the membrane
 - (ii) Increase in saturated fatty acids in the membrane
 - (iii) Increase in glycolipids in the membrane
 - (iv) Increase in phospholipids in the membrane
- (m) If a solution has to be a buffer, its pH should be
- (i) At its pKa value
 - (ii) At its Ka value
 - (iii) At 7
 - (iv) At 14.
- (n) The polarity of water molecule is due to
- (i) The readily ionizing behavior of water
 - (ii) The negative charge of water molecule
 - (iii) Difference in electronegativity of oxygen and hydrogen atoms in water
 - (iv) The positive charge of water molecule.
- (o) On the microscope stage, what is used to hold the glass slide in place and prevent it from moving?
- (i) Stage clip
 - (ii) Stage
 - (iii) Fine adjustment knob
 - (iv) Condenser

2. Answer any *ten* questions from the following:

2×10 = 20

- (a) What are the limitations of an optical microscope?
- (b) Draw the Haworth Projection formula of alpha-D-Glucose.
- (c) What do you mean by Acetyl number?
- (d) Elucidate the function of cytoskeleton.
- (e) Give example of one saturated and one unsaturated fatty acid.
- (f) What are anomers? Give examples.
- (g) Define buffer. Write the names of two important biological buffers.

- (h) Name two cell organelles which are enclosed by a single membrane.
- (i) What is the unique characteristic of mitochondria than other cell organelles?
- (j) The concentration of hydroxyl ion of a solution is 6.6×10^{-9} M. Find pOH and $[\text{H}_3\text{O}^+]$.
- (k) What is nucleoid?
- (l) What happens when fructose treated with dil. NaOH solution?
- (m) What happens when fat is hydrogenated?
- (n) For each of the following bases, determine the form of their conjugate acids.
 Br^- , NO_3^- , S_2^- , NH_3 .
- (o) Write down the principle of oil immersion microscope.

3. Answer any **two** questions from the following: 5×2 = 10
- (a) What is mutarotation? Which of the following compounds exhibit mutarotation? 2+3
(i) Fructose, (ii) Sucrose, (iii) Methyl glucoside. Explain your answer.
 - (b) Differentiate between Gram-positive and Gram-negative bacteria. What is Fluid Mosaic Model? 3+2
 - (c) Write down the structure and function of Golgi complex. 3+2
 - (d) How can you distinguish D(+) glucose from D(-) fructose? Sucrose does not react with Fehling's and Tollen's reagent. — Explain the reason. Give example of a trisaccharide. 2+2+1

N.B. : *Students have to complete submission of their Answer Scripts through E-mail / Whatsapp to their own respective colleges on the same day / date of examination within 1 hour after end of exam. University / College authorities will not be held responsible for wrong submission (at in proper address). Students are strongly advised not to submit multiple copies of the same answer script.*

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