WEST BENGAL STATE UNIVERSITY

B.Sc. Honours/Programme 4th Semester Examination, 2021

MLBHGEC04T/MLBGCOR04T-MOLECULAR BIOLOGY (GE4/DSC4)

PHYSICOCHEMICAL TECHNIQUES AND MICROBIAL GENETICS

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. Pick up the correct alternatives from the following (any ***five***) 1×5 = 5

(i) Human breathing is an example of the process

(A) diffusion (B) bulk flow

(C) both bulk flow and diffusion (D) none of these

(ii) Osmotic pressure depends on

(A) size of the solute (B) molar concentration of the solute

(C) pH gradient (D) all of these

(iii) Zero absorbance corresponds to _____ transmittance.

(A) zero (B) 1 (C) 50% (D) 100%

(iv) Bacterial genomes during their normal growth are

(A) relaxed (B) negatively supercoiled

(C) positively supercoiled (D) linear

(v) What could happen if a person in the hospital receives pure water as the intra venous fluid instead of 0.9% NaCl?

(A) The water in the I.V. fluid is hypotonic compared to the environment within their cell

(B) Red blood cells will swell and possibly burst

(C) Red blood cells will shrink

(D) The water in the IV is hypertonic compared to the environment within their cell

(vi) The buoyant density of double stranded DNA molecule is equivalent to CsCl density of

(A) 1.7 g/cm^3 (B) 1.7 mg/cm^3 (C) 1.55 g/cm^3 (D) 1.55 mg/mm^3

(vii) Which type of the following immunity can be obtained during a life span?

(A) active immunity (B) acquired immunity

(C) passive immunity (D) all of these

(viii) The unit of Diffusion constant D is

(A) m^2\sec (B) m^2 * sec (C) 1\(m^2 * sec) (D) sec^2\m

2. Rectify the following incorrect statements (any ***five***): 1×5 = 5

(i) Centipoise is the unit of relative viscosity.

(ii) Viscosity of DNA solution increases with the increase of temperature from 27°C to 95°C.

(iii) Sedimentation coefficient is expressed in gm unit.

(iv) Wavelength of green light is greater than that of orange light.

(v) In prokaryotes, transcription and translation take place in different compartment.

(vi) Reynolds' number greater than 2500 corresponds streamline motion.

(vii) Density gradient centrifugation is performed by a uv spectrophotometer.

3. Answer any ***ten*** questions from the following: 2×10 = 20

(i) How do you demonstrate that both diffusion and osmosis can be explained by similar logic?

(ii) What is the difference between Native-PAGE and SDS-PAGE?

(iii) What does the ratio A_{260}/A_{280} indicate?

(iv) State two limitations of Beer-Lambert law.

(v) What is an abortive transductant?

(vi) Explain plasmid copy number.

(vii) How can you differentiate between a colorimeter and a spectrophotometer with respect to wavelength of light?

(viii) Write the formulae of Coefficient of Viscosity defining each of the variables used in the formulae.

(ix) Name and define any two horizontal gene transfer methods.

(x) What is specialized transduction?

(xi) What do you mean by plasmid copy number? Give one example of a low copy number plasmid.

(xii) State clearly the basic principle of electrophoresis.

(xiii) What do you mean by episome?

(xiv) What is the significance of critical velocity?

(xv) What do you mean by molar absorptivity?

4. Answer any ***two*** questions from the following: 5×2 = 10

(i) Explain Newton's law of viscosity and Fick's laws of diffusion. 2+3

(ii) State Stokes' law of viscosity. How does this law evaluate the molecular weight of a biological macro molecules? 2+3

(iii) Name the basic column chromatographic components with their functions. 5

(iv) Distinguish between F+, Hfr and F-Strains. Write down the differences between generalized transduction and specialized transduction. 3+2

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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