WEST BENGAL STATE UNIVERSITY

B.Sc. General Part-II Examination, 2020

MOLECULAR BIOLOGY

PAPER: MLBG-II

Time Allotted: 2 Hours | Full Marks: 50

The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.

GROUP-A

BIOCHEMISTRY

Answer Question No. 1 and any *two* questions from the rest

1. Answer any ***two*** questions from the following: $2\frac{1}{2} \times 2 = 5$

   (a) What is 'Central Dogma of Molecular Biology'?
   (b) At which cellular site does β-oxidation occur?
   (c) Name two inhibitors of bacterial protein-synthesis.
   (d) What are ketone bodies?
   (e) Write down the structure of c-AMP.
   (f) Which vitamin has hormone-like activity?
   (g) What is denaturation of DNA?
   (h) What do you mean by 'Okazaki fragments'?

2. (a) Describe the Meselson and Stahl's experiment to prove the semi-conservative mode of DNA replication. 4
   (b) Describe the organization of the nucleosome. 4
   (c) What is Pseudouridine? Where it is found? 2

3. (a) Which enzyme is used for transcription? 2
   (b) How does transcription initiation occur in bacteria? 4
   (c) What is Shine-Dalgarno sequence? What is its function? 2+2

4. (a) How many moles of ATP are produced when I mol of C_{16} saturated fatty acid is completely oxidized to CO_2 and H_2O by β-oxidation and TCA cycle? 2
   (b) Describe the reactions of β-oxidation of saturated fatty acids having odd number of Carbon atoms. 5
   (c) Mention the role of carnitine in the oxidation of fatty acids. 3

5. Mention the differences between the following (any ***five***): 2×5 = 10
   (a) Ureotelic and Uricotelic organisms
   (b) A-DNA and Z-DNA
   (c) ρ-dependent and ρ-independent termination
   (d) Codon and anticodon
   (e) Endocrine and paracrine secretions
   (f) Glucogenic and Ketogenic amino acids
   (g) Prokaryotic m-RNA and Eukaryotic m-RNA
   (h) Nucleoside and Nucleotide

6. (a) How can you classify hormones? 4
   (b) Describe the biochemical functions of niacin and riboflavin. 3+3

7. Write short notes on the following (any ***two***): 5×2 = 10
   (a) Urea cycle
   (b) Watson and Crick Structure of DNA
   (c) Vitamin A and visual cycle
   (d) Thyroid hormones.

GROUP-B

Answer Question No. 8 and any *two* questions from the rest

8. Answer any ***two*** questions from the following: $2\frac{1}{2}\times2 = 5$
   (a) State Lambert-Beer's law.
   (b) Mention four advantages of preparatory ultracentrifuge.
   (c) What do you mean by diffusion co-efficient? State the factors it depends upon.
   (d) What do you mean by variable?
   (e) Distinguish between simple diffusion and facilitated diffusion.
   (f) Define chromophore and auxochrome.
   (g) What do you mean by specific viscosity and relative viscosity?
   (h) What do you mean by transition and transversion?

9. State whether true or false with proper reason (any ***five***): 2×5 = 10
   (a) Sedimentation coefficient of CsCl bound DNA is lower than NaCl bound DNA.
   (b) Viscosity of double-stranded DNA is lower than the denatured DNA.
   (c) Fick's first law of diffusion states that diffusion of a solute is inversely proportional in rate to the magnitude of its concentration gradient.
   (d) The coefficient of viscosity (η) is the time required to maintain the streamline flow of one fluid layer over another.
   (e) The van't Hoff equation for ionized solutes is as follows $\pi = iRT$.
   (f) DNA is more prone to hydrolysis than RNA.
   (g) DNA replication initiation requires a short primer.
   (h) The bacterial chromosome contains multiple origins of DNA replication.

10.(a) What are the basic requirements for osmosis? 3

(b) What is osmotic pressure? State the van't Hoff's laws of osmotic pressure. 2+3

(c) Write a short note on reverse osmosis. 2

11.(a) Briefly describe the effect of UV radiation on DNA. 3

(b) What is the molecular basis of photoreactivation? 3

(c) What are parallel and anti-parallel β-sheet structures in proteins? 2

(d) What is the basic principle underlying X-ray crystallography? 2

12.(a) What is the driving force behind diffusion? 2

(b) State Fick's law of diffusion. What do you mean by "flux" and show its relation with change in solute concentration? 2+3

(c) What is the significance of diffusion in human physiology? 3

13.(a) What do you mean by coefficient of viscosity? 2

(b) What are the different factors that affect coefficient of viscosity? 3

(c) State Poiseuille's law of viscosity. 3

(d) What is Stokes radius? 2

14.(a) Write the empirical relationship between mean, median and mode. 1

(b) What is class interval or class? 1

(c) Calculate the mean, median, standard deviation and variance of the following data: 2×4

Height in inches	95-105	105-115	115-125	125-135	135-145
No. of children	19	23	36	70	52

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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