PG/IS/ZOOL/Z-103/09

M.Sc 1st Semester Examination, 2009

ZOOLOGY

PAPER—Z-103

Full Marks : 40

Time : 2 hours

The figures in the right-hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

Write the answers to questions of each Group in separate books

GROUP—A

(*Microbiology*)

1. Answer any *two* :   2 × 2

   (*a*) Define Mesosomes.

(b) Name the viruses causing Hepatitis B and Small Pox.

(c) What do you mean by Sugar Fermentation test ?

(d) Distinguish between NAM and NAG.

2. Answer any *two* :　　　　　　　　　　　　4 × 2

   (a) Mention the differences between 'Enriched' and 'Enrichment' media.

   (b) State Morphological classification of Fungi with suitable examples of each group.

   (c) Draw a labelled structure of Gram negative cell wall. List the general functions of bacterial cell wall.

   (d) What are the primary sources of energy and electrons for nutrition of bacteria ?

3. Answer *one* of the following :　　　　　　　　8 × 1

   (a) (i) Describe how 'Smooth' bacteria can become 'Rough'.

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(*ii*) State the distinguishing features of sheath and capsule.

(*iii*) Discuss, various cultural characteristics of bacteria with suitable illustration.   2 + 2 + 4

(*b*) (*i*) Explain the stationary phase in bacterial growth.

(*ii*) Draw the structure of a Flagella.

(*iii*) Mention distinctive features of Exotoxin and Endotoxin.   2 + 2 + 4

GROUP—B

(*Biophysics*)

1. Answer any *two* questions :   2 x 2

(*a*) Why resting molecular O_2 uptake is higher in children than in adults.

(*b*) State the different parts of a phospholipid molecule.

(c) What is K_f ?

(d) Show the different components of $Na^+ - K^+$ ATPase with a diagram.

2. Answer any *two* questions :   4 × 2

(a) Discuss the role of Osmotic pressure in the exchange of body fluid across blood capillaries.

(b) Write a short notes on liposome.

(c) How you prove that

$$N = N_0 \cdot e^{-\lambda t}$$

(Let N_0 be the number of radioactive atoms present in the beginning at $t = 0$ and let N be the number of radioactive atoms present at any time t and λ = disintegration constant.)

(d) Write the Henderson-Hasselbach equation for a buffer solution. Mention the factors which determine the pH and capacity of a buffer.

3. Answer *one* of the following questions : 8 x 1

(a) What are membrane proteins ? Describe with suitable diagram the various ways by which they are associated with membrane lipids. 2 + 6

(b) (i) In a chemical reaction, how the free energy (ΔG) is expressed ? What is standard free energy change ($\Delta G°$) ? How is it expressed.

(ii) A calculation of standard free energy change ($\Delta G°$) can be made from equilibrium data on the enzyme phosphoglucomutase in the following reaction at 25°C :
Glucose-1-Phosphate $\rightleftharpoons$ Glucose
-6-Phosphate.
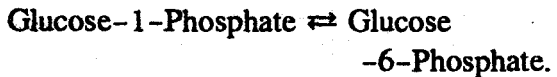
Concentrations of Glucose-1-phosphate and Glucose-6-phosphate at equilibrium are 0.001 (M) and 0.019 (M) respectively. Calculate $\Delta G°$ in calori per mole. Is it a spontaneous reaction ?

[Given $R = 1.98$ cal mole^{-1} deg^{-1}].

(2 + 1 + 1) + (3 + 1)