RAMAKRISHNA MISSION VIDYAMANDIRA (Residential Autonomous College under University of Calcutta)							
FIRST YEAR B.A./B.SC. SECOND SEMESTER (January – June) 2014 Mid-Semester Examination, March 2014							
Date	:	24/03/2014 MICROBIOLOGY (Honours)					
Time	:	11 am – 1 pm Paper : II I	ull Marks : 50				
1.	a) b)	What do you mean by photolithoautotrophic bacteria? Give an example.	[2+1] [2×3]				
	0)	<ul><li>i) reverse electron flow is an energy consuming process</li><li>ii) most iron oxidizing bacteria are acidophilic</li></ul>					
(	c)	How would you differentiate a lactose fermenting bacterium from a lactose non fermentin	g one? [3]				
	d)	How does a bacterium determine the site of cell division?	[3]				
2.	a)	Define specific activity of a radioactive substance.	[2]				
1	b)	Mention some limitations of thermodynamics.	[3]				
	c)	Ca <sup>45</sup> has a half life of 163 days. Calculate— i) the decay constant ( $\lambda$ ) in terms of day <sup>-1</sup> and sec <sup>-1</sup>					
		ii) the percent of the initial radioactivity remaining in a sample after 90 days.	[2×1·5]				
	d)	Define coupled reactions. Explain with example.	[2]				
		Or,					
;	a)	$C^{14}$ has a half life of 5700 years. Calculate the fraction of the $C^{14}$ atoms that decays, (i) per minute	er year (ii) [1+1]				
1	b)	$K^{40}$ (t <sub>1/2</sub> = 1.3×10 <sup>9</sup> yr) constitutes 0.012% of the potassium in nature. The human body	v contains				
		about $0.35\%$ potassium by weight. Calculate the total radioactivity resulting from $K^{40}$ dec kg human.	ay in a 75 [3]				
	c)	Write a short note on Scintillation Counter.	[3]				
	d)	Define Gibbs free energy.	[2]				

3. Body length of fishes of a species was obtained from two ponds. They were measured (in cms) as follows :

Pond A	20	24	20	28	22	20	24	32	24	26
Pond B	12	10	8	10	6	4	14	20	10	6

Calculate the mean difference in total body weight between the two ponds' fishes is significant or not.

### Or,

In a laboratory, the following results  $(F_2)$  are obtained, wrinkled seed 884 and round seed 288. Calculate goodness of fit for these data. [5]

- 4. a) What is mutarotation? Describe its mechanism in brief. [4]
  - b) What happens when sorbitol is treated with periodic acid?
  - c) "Anomeric effect is inversely proportional to the dielectric constant" —Discuss it with suitable example. [2]

[2]

- a) State Lambert Beer's law. What is the meaning of  $\in_{max}$ ? 5.
  - b) Draw a diagram to explain hyperchromicity and hypochromicity in case of nucleic acid containing nucleotide, single stranded DNA and double stranded DNA. [2]

[1+2]

## Or,

a)	What is an Auxochrome? Define the term Red shift and Blue shift.	[1+1]
b)	What are the amino acids that show strong absorption in the UV region?	[1]

- b) What are the amino acids that show strong absorption in the UV region?
- c) When a protein containing a few such amino acids (as referred in (b)) is precipitated in polar or non-polar solvent, their ultraviolet spectral characteristics differ— explain such observations.

#### 6. a) Write the structure and the IUPAC nomenclature of :

Caproic acid i) ii) Behenic acid iii)  $\alpha$ -Linolenic acid [3×2] b) Give an example of Positional isomerism in fatty acids. [1]

# Or,

a)	How does Arochidonic acid and $\gamma$ -Linolenic acid differ from most other fatty acids? [Give on	e
	aspect of difference]	[2]
b)	How does a soap cleanse dirt?	[3]
c)	What is Hunsdiecker reaction?	[2]

## 80衆Q3