

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

FIRST YEAR

B.A./B.SC. SECOND SEMESTER (January – June) 2013

Mid-Semester Examination, March 2013

Date : 04/03/2013

MICROBIOLOGY (Honours)

Time : 11 am – 1 pm

Paper : II

Full Marks : 50

1. a) Define macronutrients? Cite suitable example. [2]
- b) How can you define an auxotroph? [2]
- c) What is nitrification? Express this process in reactions. [2+2]
- d) What happens to a bacterial cell if FtsZ proteins are not formed? [2]

Or

- a) How can you define microbial growth factors? Cite an example of a common bacterium and mention its growth factor requirements. [2+3]
 - b) How is the bacteria classified on the basis of their nutritional requirements. [3]
 - c) Why don't you add micronutrients during preparation of a culture medium? [2]
2. a) Define relative activity and specific activity of a radioactive substance. [1½+1½]
 - b) Mn54 has a half life of 314 days. Calculate—
 - i) the decay constant in terms of days⁻¹ and sec⁻¹
 - ii) % of initial radioactivity remaining in a sample after 80 days. [3]
 - c) Define enthalpy and entropy. [1+1]
 - d) What is coupled reaction? Explain with proper example. [3]
 - e) Briefly explain the mathematical formulations of the first law of thermodynamics. [2]
 - f) Mention some important limitations of thermodynamics. [2]

Or

- a) Define C_p and C_v. [1+1]
 - b) Derive the relation between half life and average life of a radioactive substance. [3]
 - c) The conversion of glucose to lactic acid has an overall $\Delta G'$ of -52,000 cal/mole. In an anaerobic cell, this conversion is coupled to the synthesis of 2 moles of ATP per mole of glucose, (Given, $\text{ADP} + \text{P}_i \rightarrow \text{ATP}$, $\Delta G' = +7700 \text{ cal / mole}$).
Calculate the $\Delta G'$ of the overall coupled reactions. [2]
 - d) What is 'artificial radioactivity'? Explain with proper example. [3]
 - e) Write short notes on— [2½×2]
 - i) MRI
 - ii) Liquid Scintillation Counter
3. a) What is anomeric effect? Give example. [2]
 - b) How will you convert arabinose to glucose? [2]
 - c) What will happen when sucrose is treated with HIO₄ followed by Br₂/water oxidation? [3]
 - d) What do you mean by reducing sugar? Give example. [1]
 - e) Glucose and fructose give same osazone. —Justify the statement [2]
4. Melting point of some 18C fatty acids are :
Stearic acid (69·6°C); Oleic acid (13·4°C); Elaidic acid (42·8°C); Linoleic acid (-5°C)
Explain—
 - a) Why has stearic acid the highest melting point of all? [3]
 - b) Why have oleic and elaidic acid different melting points? [2]
 - c) Why has linoleic acid the lowest melting point of all? [2]

5. Branch chain fatty acids are found in some bacterial lipids. Would their presence increase or decrease the fluidity of the membranes? Justify. [1+2]
6. a) Mention the important characteristics of chi-square. [2]
b) What is null hypothesis? [1]
c) Name the different types of chi-square. [2]

Or

Crossing of purple-eyed straight winged *Drosophila* with red eyed curved winged one produced dihybrid red eyed straight winged females in F_1 . On crossing such F_1 females with double recessive purple eyed curved winged males give following phenotypes.

Red eyed straight winged – 339

Purple eyed straight winged – 612

Red eyed curved winged – 725

Purple eyed curved winged – 348

Find out whether or not F_1 generation obeys the test cross ratio. [5]

