Sl. No. : 1948 **GC -3**

Unique Paper Code : 42173902

Name of the Paper : Biotechnology

Name of the Course : B.Sc. Prog SEC

Semester : III

Duration : 2 hours

Maximum Marks : 37 ½

Instructions for Candidates:

Attempt any three questions in all. Question No. 1 is compulsory and each question carries $12\frac{1}{2}$ marks.

Q1.Answer the following:

(a) "Green Chemistry is sustainable chemistry". Explain the statement.

(b) Complete the following equation

Risk = Hazard × ----------.

(c)Which of the following is not one of the twelve principles of green chemistry:

(i) Less Hazardous chemical synthesis.
(ii) Maximization of atom economy
(iii) Using high temperature to speed up reactions
(iv) Use of Renewable feedstocks.

(d) Atom Economy is a measure of the ---------- of a reaction.

(e) Define right fit pigment. Why they also be called Azopigments?

(f) Explain the working mechanism of carbon dioxide surfactants in garment industry.

[2, 1, 1, 1, 3 ½, 4]

Q2. (i) What is Green Chemistry?

(ii) Write twelve principles of Green Chemistry with explanation. [2, 10 ½]

Q3 a). Define ATOM ECONOMY.

b). How can you improve the Atom Economy of a reaction?

c). Calculate the ATOM ECONOMY of the following reaction:

The Fermentation of the Sugar to make ethanol

$C_6H_{12}O_6$ (aq.) $\rightarrow$ $2C_2H_5OH$ (aq.) + $2CO_2$ (g)

d). List the problems associated with Lead and Cadmium based pigments. How these problems can be resolved? [2, 2, 5, 3 ½]

Q4. Write short notes on the following:

a) Surfactants for carbon dioxide
b) Ionic Liquids
c) Green Energy and Sustainability. [4, 4, 4 ½]
