CARMEL COLLEGE OF ARTS, SCIENCE & COMMERCE FOR WOMEN, NUVEM-GOA
SEMESTER END EXAMINATION JANUARY 2021
Semester: V of B.Sc.
Course name & Code: Green Methods and Safety Aspects in Chemistry CHD102
Total marks:80 **Duration: 2 hours** **Total No of pages: 3**

Instructions: *1) Answers to the two sections should be written on separate answer books.*
2) All questions are compulsory
3) Figures to the right indicate full marks
4) For questions 2,3,5 & 6 there is choice for question A

Section A

Q1) Answer **Any four** of the following. (4 x 4 = 16 marks)

i. What is Green Chemistry? What are the twelve principles of green chemistry?

ii. Explain the green extraction of D-limonene from orange peel

iii. Explain the role of alternative sources of energy in chemistry.

iv. Explain the green synthesis of a biodegradable polymer

v. Why are ionic liquids considered to be green solvent?

vi. Why there is a need to replace tetrachloroethylene as solvent for dry cleaning?

Q2.A) i) Explain the importance of Green Chemistry (4 marks)

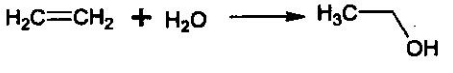
ii) Give the structures of any two environmentally benign pigments (2 marks)

OR

Q2.A) iii) Calculate the percent atom economy for the reactions below. According to the Green Chemistry principles which among the following is considered to be a green reaction and why? (atomic mass of Ca=40).

a) CaO from $CaCO_3$ (2 marks)

b) Reaction of ethene with water (2 marks)



iv) What are the environmental problems associated with organic dyes and pigments? (2 marks)

Q2.B) i) Define phase transfer catalyst and explain its mechanism in nucleophilic substitution reaction (4 marks)

ii) What the effects of volatile organic compounds on the environment? (2 marks)

Q3.A) i) What are Solid-solid synthesis in green chemistry techniques? Explain the procedure involved in the synthesis of Schiff's base formed from p-toluidine and o-vanillin. (4 marks)

ii) Give any two application of EPDM rubbers (2 marks)

OR

Q3.A) iii) Define catalyst. Give any two reactions that involves natural catalyst. (4 marks)

iv) Explain the green process involved in acetic acid manufacture. (2 marks)

Q3.B) i) Explain the real-world case study in designing environmentally safe marine anti-foulants. (4 marks)

ii) Discuss the potential of biomass as a source of renewable energy. (2 marks)

Section B

Q4) Answer **Any four** of the following. (4 x 4 =16 marks)

i) Write a note on the hazardous exposure of KCN

ii) Write note on chemical spills

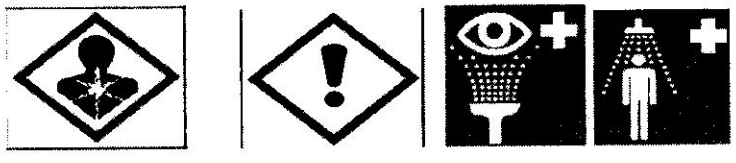
iii) Enlist the different type of waste produced in chemical lab

iv) What are the ways we can reduce exposure to harmful chemicals

v) Write a note on flammable hazard

vi) What care must be taken while selecting container for lab waste disposal

Q5.A)i) Identify the following symbols. (4 marks)



ii) What care must be taken while disposing of oxidizers and acids? (2 marks)

OR

Q5.A) iii) What is risk assessment? Why is it essential? (4 marks)

iv) Enlist the different ways we can reduce hazardous waste. (2 marks)

Q5.B) i) Enlist the types of fire extinguishers (4 marks)

ii) Enlist the different ways we can protect ourselves from hazardous chemicals. (2 marks)

Q6.A) i) Write a note on a clean agent fire extinguisher. How does one operate a fire extinguisher? (4 marks)

ii) What are the consequences of mixing incompatible laboratory waste? (2 marks)

OR

Q6.A) iii) What is the full form of MSDS & SDS. How are they different? (4 marks)

iv) How are batteries disposed off? (2 marks)

Q6.B) i) Write a note on characteristic of hazardous waste. (4 marks)

ii) What is the specification and requirement for a safety shower (2 marks)