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Total number of pages : 02

B.Tech
PCE7J004

7th Semester Regular Examination 2018–19

GREEN TECHNOLOGY

BRANCH : CHEM

Time : 3 Hours

Max Marks : 100

Q.CODE : E147

Answer Question No.1 (Part-I) which is compulsory, any EIGHT from Part-II, and any TWO from Part-III.

The figures in the right-hand margin indicate marks.

Assume suitable notations and any missing data wherever necessary.

Answer all parts of a question at a place.

Part – I

Short Answer Type Questions (Answer All TEN)

Q1

Answer the following questions :

(10 x 2)

- "Green chemistry is sustainable chemistry". Justify.
- Identify the 6 R's pointed out by Green chemistry.
- What is green engineering and what does it encompass?
- Enumerate the four pillars of Green technology.
- Discuss any two uses of zeolites.
- What do you mean by photo-catalysis ?
- What is PEG and mention its formula?
- Define supercritical fluids.
- What do you mean by second generation biofuel?
- What is process intensification?

Part – II

Focused-Short Answer Type Questions(Answer Any EIGHT out of TWELVE)

Q2

Answer the following questions :

(6 x 8)

- Why does industry need Green chemistry?
- What is Green technology? What are the major applications of Green technology?
- What is Green engineering? Write down the twelve principles of Green engineering.
- Explain the benefits of 'Green chemistry' to human health, environment, and economy & business.
- Ethanol may be synthesized by the following two routes²(in presence of catalysts):
 - $C_6H_{12}O_6(aq) \rightarrow 2C_2H_5OH(aq) + 2CO_2(g)$
 - $C_2H_4(g) + H_2O(g) \rightarrow C_2H_5OH(l)$
 - What is the % atom economy of both the reactions?
 - Which route is to be considered greener for the production of ethanol in your opinion ? Give reasons of your answer.
- What is Nano-catalyst? What are the applications of Nano-catalysts?
- What are zeolites? Explain the properties and applications of zeolites.
- How PEG is produced? Explain its major areas of application.

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- i) What is supercritical fluids and supercritical CO₂? What are its advantages?
 - j) What is scale-up effect? Explain the classification of scale-up effect.
 - k) Define 'Process intensification'. Enlist design considerations for process intensification and characteristics of an intensified process.
 - l) Explain the different processes of thermo chemical conversion of biomass into fuel.

Part – III

Long Answer Type Questions (Answer Any TWO out of FOUR)

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- Q3** What is Green chemistry? Elaborate the twelve principles of Green chemistry with two examples of each. **(16)**
- Q4** Elaborate the statement –“Microwave heating as a greener technology”. Explain the principle of microwave heating along with the reactors that are used in microwave irradiation. **(16)**
- Q5** What are Green solvents? Why ionic liquids are considered as replacement for conventional organic solvents? What are the recovery methods for regeneration of ILs? **(16)**
- Q6** Explain about renewable energy resources? Explain in details about bioconversion of renewable. **(16)**
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