Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, Jun 2021

Course: Green Chemistry **Semester:** II
Program: M. Sc. Chemistry **Time:** 03 hrs.
Course Code: CHEM 8002 **Max. Marks:** 100

SECTION - A **6 x 5 = 30 Marks**

1. Each Question will carry 5 Marks
2. Instruction: Complete the statement / choose the correct answer(s)

Q 1	**A:** Green chemistry aims to? a) Design chemical products and process that maximize profits b) Design safer chemical products and processes that reduce or eliminate the use and generation of hazardous substances c) Design chemical products and processes that work most efficiently d) Utilize non-renewable energy B: Which of the following are among the 12 Principles of Green Chemistry? a) Design commercially viable products b) Use only new solvents c) Use catalysts, not stoichiometric reagents d) Re-use waste	CO1
Q 2	**A:** Dr. Paul Anastas & Dr. John Warner created 10 Principles of Green Chemistry to reduce or eliminate the use and generation of hazardous substances? a) True b) False **B:** Green chemistry is more expensive than traditional chemistry? a) True b) False	CO1

Q 3	**A:** We must use feedstock derived from annually renewable resources or from _____ a) Chemicals b) Organic compounds c) Abundant waste d) Plants **B:** The principles of green chemistry include eliminating _____treatments. a) Costly b) Harmful c) Hard d) Easy	CO1
Q 4	Choose correct biocatalysts from the following list. **A:** $RX/AlCl_3$ **D:** $HNO_3+H_2SO_4$ **B:** nano silver with polymer base **E:** Zeolites **C:** aq. HCl/ΔT **F:** NaOH/ΔT	CO1
Q 5	**A.** Green chemistry improves _____ of chemical manufacturers. a) Competitiveness b) Easiness of production c) Services d) Chemicals **B.** The green synthesis methods should have _____. a) Low efficiency b) High harmful products c) Low energy requirements d) Low atom efficiency	CO2 CO2
Q 6	Select the correct Green solvents from the below list. **A:** Toluene **D:** Ether **G:** ethyl lactate **J:** Acetone **B:** Hexane **E:** Water **H:** cyclo pentyl methylether **C:** Glycerol **F:** Lactone **I :** 2-methyltetrahydrofuran	CO2
SECTION – B 10 x 5 = 50 Marks **1. Each question will carry 10 marks** **2. Instruction: Write short / brief notes**		
Q 1	**A:** Describe goals of Green Chemistry. **B:** How Green Chemistry advances towards a sustainable future.	CO1
Q 2	Illustrate the differences and similarities Green Chemistry with Environmental Chemistry.	CO1
Q 3	**A:** How Green Chemistry is interdisciplinary in nature? **B:** Describe Environmental Laws related to Green chemistry.	CO1

Q 4	Explain with minimum two national and one international industrial case study on wealth from waste (Green Chemistry point of view).	CO2
Q 5	**A:** Describe new emerging Green Technologies. **B: W**hy one can focus on next generation Catalyst Design methods?	CO2
Section – C **1 x 20 = 20 Marks** **1. Each Question carries 20 Marks.** **2. Instruction: Write long answer.**		
Q 1	**A:** Depict selective method for the oxidation of 5-hydroxymethylfurfural (HMF) by using hydrogen peroxide (H_2O_2) and activated-carbon-supported ruthenium (Ru/AC) as the catalyst. **B:** Discuss the solvent free synthesis methods with examples. ***OR*** **A:** Explain any THREE methods of greener approaches for nanoparticle synthesis. **B:** Discuss about the microwave-assisted synthesis method of Green chemicals with example.	CO1 CO2 CO1 CO2