Name: Enrolment No:	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
Online End Semester Examination, May 2020

Course: Plant Utilities (Elective) **Semester: V**
Program: B. Tech. CE+RP **Time 03 hrs.**
Course Code: CHCE 3017 **Max. Marks: 100**

SECTION A (6Q x 5 = 30 marks)

1. **Each Question will carry 5 Marks**
2. **Instruction: Complete the statement / Type the answer in 20-100 words.**

S. No.	Question	CO
Q 1	Describe some effects of impurities in boiler feed water.	**CO1**
Q2	Give some prominent uses of reciprocating compressors OR Give some prominent uses of centrifugal compressors.	**CO2**
Q3	Explain how use of multistage compression leads to safety in operations.	**CO3**
Q4	List some advantages of using ethanol as fuel OR List some advantages of using bio-diesel as fuel	**CO4**
Q5	53% of India's installed power capacity uses coal as its fuel. Agree or disagree while giving explanations if use of coal is safe and pollution-free.	**CO3**
Q6	Give the importance of water as process plant utility.	**CO1**

SECTION B (5Q x 10 = 50 marks)

1. **Each question will carry 10 marks**
2. **Instruction: Write full notes**

Q 7	Write a full note on equipment used for humidification and dehumidification	**CO2**
Q 8	What are the potential hazards of industrial waste and describe some methods of disposal.	**CO3**
Q 9	Elaborate some methods of water treatment with the viewpoint of demineralization.	**CO1**
Q 10	A cylinder contains at initial state 0.5 m^3 of gas at 100 kPa and 100 °C. The gas is compressed according to the law $PV^n = C$ to a final state of a volume of 0.10 m^3 and the final pressure of 750 KPa. You may Use $\gamma = 1.41$ and G = 0.298 kJ/kg °C. (1) Show the process on a P-V diagram. (2) Determine the index of compression = n (3) Determine the increase in internal energy. (4) What type of compression is being carried out in the current process, and what is the importance of this compression? (5) Calculate the entropy change, with full expression if the process of compression from initial to final state is adiabatic.	**CO2**

Q 11	Waste heat boilers are available in a variety of capacities, allowing for gas intakes from 1000 to 1 million ft^3/min. In cases where the waste heat is not sufficient for producing desired levels of steam, auxiliary burners or an afterburner can be added to attain higher steam output. The steam can be used for process heating or for power generation. With this information given, describe some waste heat boiler, and explain how it will lead to better energy savings for a process plant.	**CO4**

Section C (1Q x 20 = 20 marks)

1. **Each Question carries 20 Marks.**
2. **Instruction: Write long answer.**

Q12	Write in full details about vapor compression refrigeration system. Also show the process on T-S and P-V diagram. How will you calculate CoP of such system and how will you analyze energy requirements What kind of refrigerants will be used in such a system? OR Give a full Review the technologies used for liquefaction of gases. What is the engineering importance of critical point in liquefaction of gases. What is the application of Joule-Thompson effect in liquefaction process. Also describe one liquefaction proceeds and give process diagram also.	**CO4**