


Name:			
Enrolment No:			
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES Online End Semester Examination, December 2021			
Course: Plant Utilities (Elective)		Semester: V	
Program: B. Tech. CE+RP		Duration: 03 hrs.	
Course Code: CHCE 3017P		Max. Marks: 100	
Instructions: Pl attempt as directed.			
SECTION A: Scan and upload (5Q x 4M = 20 M) Instruction: Complete the statement or answer in 20-100 words.			
S. No.	Question	Marks	CO
Q1	List advantages of ion exchange and resin properties in few words.	4	CO1
Q2	Give the importance of air as process plant utility.	4	CO2
Q3	Give some prominent uses of reciprocating compressors.	4	CO2
Q4	List the major components of vapor compression refrigeration system and safety features.	4	CO3
Q5	53% of India's installed power capacity uses coal as its fuel. Explain if this is a desirable or undesirable situation for an economically developing country like India.	4	CO4
SECTION B: Scan and upload (4Q x 10M = 40 M) Instruction: Write full notes			
S. No.	Question	Marks	CO
Q7	<p>“Economic viability is the key difference between a commercial manufacturing unit.” Justify this stand by taking a Utilities view of the chemical or petrochemical plants in general, and discussing some prominent utility streams of the plant, and how the mismanagement of prominent utility streams can destroy the economic viability. (10 Marks)</p> <p>OR</p> <p>“ The various complex processes and utilities of Urea Fertilizer Production pose some unique risks.” .” Also discuss the problems of aging plants and how their mismanagement or safety violations (for example, improper Personal Protection Equipment) will an destroy the safety. (10 Marks)</p>	10	CO3
Q8	What are the class of industrial waste? Explain the potential hazards of industrial waste and describe some methods of disposal. Demonstrate how the industrial waste management is related to sustainability.? (10 Marks)	10	CO3
Q9	State the classification of compressors, and justify the said classification. Describe the velocity diagram of a centrifugal compressor. (10 Marks)	10	CO2

Q10	Describe the construction, design and working of either thermodynamic or bimetallic steam trap. Explain the role of steam traps in plant energy savings. (10 Marks)	10	CO4
SECTION C: Scan and upload (2Q x 20M = 40 M) Instruction: Write critical notes			
S. No.	Question	Marks	CO
Q11	<p>A boiler generates 800 Kg of steam per hour at a pressure of 10 bar and 50 degree, and burns 100 Kg/hr of coal. The HCV of coal is 30 mega joules, and feed water temperature is 40 °C. h_g of saturated steam at 10 bars is known to be 2778.1 kJ/kg and specific heat of superheated steam, $C_{v,sup}$ is 2.1 kJ/kg. For calculation of h_{sup}, the formula of $h_{sup} = h_g + C_{v,sup} * (T_{sup} - T_g)$ should be employed if possible. The specific heat of liquid water is 4.187 kJ/kg and a similar formula can be used to evaluate h_{feed} without any difficulty. The students are required to analyze the full boiler parameters by evaluating the following: (20 Marks)</p> <ol style="list-style-type: none"> 1. The factor of equivalent evaporation 2. The actual evaporation per kg of coal burnt 3. The equivalent evaporation 4. The boiler efficiency 	20	CO2
Q12	<p>“The Internal Combustion is one of the prominent machinery which is intimately linked to the type of fuels as well.” Justify this statement and Describe and illustrate the construction of an internal combustion engine and explain the importance and significance of each component. Explain the role of intercoolers for performance enhancement. (20 Marks)</p> <p>OR</p> <p>“The Diesel fuel has been a great revolution for refiners as well as vehicle owners.” Justify this statement and Describe the thermodynamic Diesel cycle. Also describe the Diesel fuel properties in as much detail as possible. Also compare Diesel Fuel to bio-diesel fuel. (20 Marks)</p>	20	CO2

INSTRUCTIONS FOR STUDENTS

- ◆ Kindly take the examination from Laptop + Mobile or Mobile only with recommended OS & Browser (mentioned in Exam manual)
- ◆ Use Plain paper (A4 sheet) & Blue or Black Pen
- ◆ Kindly note that to avoid connectivity glitches while uploading your answer sheet, please try to finish earlier than the end time to ensure uploading. To Scan and Upload answers please make sure that when picture is being taken:
 - ensure that shadows do not fall on the paper
 - ensure that the camera is held stably above the answer sheet in parallel to it ensure the frame of the picture includes the answer sheet and no surroundings
 - ensure sufficient lighting in the room
 - If your answer is more than 1 page for particular question, please scan all the pages of answer and then press the upload button
 - Same questions should be opened on laptop for which you are uploading scanned answer sheet from mobile

Example: If you are scanning answer sheet for Que No. 1 from Mobile, then Que No. 1 should be visible on your laptop screen.