MGM University, Chhatrapati Sambhajinagar
Jawaharlal Nehru Engineering College
CA 1 Examination

Course: SY Chemical Engineering　　　　　　**Sem:** IV
Subject Name: Process Instrumentation and Control　　**Subject Code:** 20UCH405D
Max Marks:20　　　　**Date:**06.03.2024　　　　**Duration:-** 1 Hr.

N.B.: i answer the following question
　　ii. Assume suitable data, if required and draw neat sketches whenever needed.
　　iii. Figure to right indicate full marks

		CO	BL	Marks
Q. 1	Select correct option			6*1
A	The Bourdon element in a pressure thermometer is a)Primary sensing element　b) Variable conversion element c) Data transmission element　d) Data presentation element	1	understand	
B	The smallest increment in the measured value that can be detected with certainty is termed as a) Hysteresis　b) Drift　c) Resolution　d) Threshold	1	Understand	
C	In a measurement, what is the term used to specify the closeness of two or more measurements? a)Threshold　b)Accuracy　c)Precision　d) None of the above	1	Understand	
D	What is the role of instrumentation in a chemical process plant? a)Improve the safety of operation　　b) Improve quality of product c) Improve the economy　　　　d) All of these	1	Remember	
E	_____ temperature scale assigns 0° to the 'ice point' and 80° to the 'steam point' 　a)　Celsius　　b) Rankin　　c) Reaumur　　d) Fahrenheit	1	Apply	
F	Which of the following is true for bimetallic thermometer a)Two metal have different temperature coefficient b) One metal is cooled always c)Two metal have same temperature coefficient　d) None of these	2	Apply	
Q. 2	Answer any two of the following			3*2
A	With neat sketch explain working principle of mercury thermometer	2	Remember	
B	With neat sketch explain construction and working principle of bimetallic thermometer	2	Remember	
C	With neat sketch explain construction and working principle of RTD thermometer	3	Understand	
Q. 3	Answer any one of the following			8*1
A	With neat sketch explain construction and working principle of Bourdon type pressure measuring instruments. List its advantages and limitations	3	Understand	
B	What are the benefits of diaphragm type pressure measuring instruments? explain its construction and working principle	3	Understand	

MGM University
Jawaharlal Nehru Engineering College, Aurangabad
Mid Semester Examination – 2023

Program : SY B. Tech in Chemical Engineering   Sem: IV

Course Name: **Industrial Pollution Control**   Subject Code:**20UCH404D**

Max Marks: 20   Date:- /3/2024   Duration:- 1 Hr

Instructions to the students

1. All questions are compulsory 2.Assume Suitable data if necessary

Q No		C.O	B.L	Marks
Q 1				6
a	Give the types of pollution.	1	1	
b	What is Acid Rain?	2	1	
c	Write briefly sources of pollution.	1	1	
d	Write about the effects of pollutant on materials	1	1	
e	List out the composition of atmosphere.	2	1	
f	What are primary and secondary pollutants?	1	1	
Q 2	**Solve any two of the following**			3 * 2
(A)	Explain Plume behavior with neat sketch.	2	3	
(B)	Explain with neat sketches the principle and working of Fabric Filter	2	3	
(C)	Explain with neat sketches the principle and working of Cyclone Separator	2	3	
Q 3	**Solve any one of the following.**			8
(A)	Determine the effective stack height of a stack given the following data: Physical stack height is 203m tall with 1.07m ID Wind velocity is 3.86m/s Air Tempt. Is 13°C Pressure is 1000milibars Stack gas velocity is 9.14 m/s Stack gas tempt. is 149°C	2	3	
(B)	Explain in detail the procedure for stack gas sampling	2	3	

MGM University
Jawaharlal Nehru Engineering College, Aurangabad
Mid Semester Examination – April 2022

Program : B. Tech in Chemical Engineering
Course Name: **Chemical and Allied Industries**
Date:- / 3/2024
Max Marks: 20

Sem : IV
Subject Code:**20UCH401D**
Duration:- 1 Hr

Instructions to the students
1. All questions are compulsory

Q No		CO	B.L	Marks
				6
Q 1		1	1	
a	Explain Role of Chemical Engineer.	2	1	
b	Explain the uses of Sulfur and its derivatives.	1	1	
c	Explain the uses of soda ash	1	1	
d	In brief give the Potassium recovery from sea water	2	1	
e	What is difference between Soap & Detergent	1	1	
f	Write a note on sources of Salts			
				3 *
Q 2	Solve any two of the following	2	3	
(A)	Describe manufacturing of Ammonia with neat diagram.	2	3	
(B)	Discuss Elemental sulfur mining by Frasch process.	2	3	
(C)	Describe manufacturing of Superphosphate with neat diagram.			
Q 3	Solve any one of the following.			
(A)	Describe manufacturing process of Urea by Ammonium Carbamate with neat diagram and explain the major engineering problems involved in it.	1	3	
(B)	Describe manufacturing of Phosphoric acid by Wet process with neat diagram and explain major engineering problems involved in it.	1	3	

MGM University
Jawaharlal Nehru Engineering College, Aurangabad
Mid Semester Examination –March 2024

Program: B. Tech in Chemical Engineering | Sem: IV
Course Name: Mass transfer operation-II
Subject Code: BTCHC 601
Max Marks: 20 Date:-08/03/2024 Duration:- 1 Hr

Instructions to the students
1. All questions are compulsory
2. Assume suitable data if required.
3. Draw neat sketches if required

Q. No.		CO	B.L	Marks
Q 1	1. The component A and B has the same boiling point. Can the separation is done by ordinary separation? a)True b) False	CO1	1	6
	2. An azeotropic mixture is a _____ mixture. a) binaryb) constant boiling pointc) none of thesed)ternary	CO2	3	
	3. Rectifying continuously is known as _____ a)Partializationb) Fractionation c) Condensation d) None of the mentioned	CO1	2	
	4. In stripping section of continuous distillation column, the a) liquid is enriched with high boiler b) vapour is stripped of low boiler c) liquid is stripped of high boiler d) none of these.	CO2	1	
	5. Fractional extraction is also known as _____ a)Solventb) Double solventc) Triple solventd) None of the mentioned	CO3	2	
	6. The apex of an equilateral-triangular coordinate (in ternary liquid system) represents a/an a)pure component b) binary mixture c) ternary mixture d) insoluble binary system	CO3	3	
Q 2	Solve any two of the following			3 * 2
(A)	Illustrate Steam Distillation.	CO1	1	
(B)	Write down azeotropic distillation.	CO2	2	
(C)	Explain Equilateral-Triangular Coordinates	CO3	3	
Q 3	Solve any one of the following.			8
(A)	Derive expression for multistage tray towers-method of Mc-cabe and thiele mehod.	CO3	2	
(B)	A liquid mixture containing 50 mol % n-heptane (A), 50 mol % n-octane (B), at 30°C, is to be continuously flash-vaporized at 1 std. atm. pressure to vaporize 60 mol % of the feed. What will be the composition of the vapor and liquid and the temperature in the separator for an equilibrium stage?	CO1	3	

MGM University
Jawaharlal Nehru Engineering College, Aurangabad
Mid Semester Examination – March 2024

Program: B. Tech in Chemical Engineering

Course Name: Heat Transfer Operation (A)

Max Marks: 20　　　　　Date:- 08/03/2024

Sem: IV

Subject Code: UCH403D

Duration:- 1 Hr

Instructions to the students
1. All questions are compulsory
2. Assume suitable data if required.
3. Draw neat sketches if required.

Q No		C.O	B.L	Marks
Q 1				6
	1) The unit of heat transfer co-efficient in SI unit is----------------- . a) J/M2°K b) W/m2°K c) W/m°K d) J/m°K	CO3	2	
	2. At constant temperature, the thermal conductivities of gases _____ with rise in pressure a) may increase or decrease; depends on the pressure b) increases c) decreases d) remain unchanged	CO1	1	
	3. What is the purpose of using fins in a particular heat transfer system? A) to decrease rate of heat transfer b) to increase rate of heat transfer c) to maintain rate of heat transfer at a constant rate d) cannot say	CO2	2	
	4. Which of the following has maximum thermal conductivity? A) Iron b) coal c) Nitrogen d) tar	CO1	1	
	5. For insulation to be properly effective in restricting heat transmission, the pipe radius r0 will be a) Greater than critical radius b) Less than critical radius c) Equal to critical radius d) Greater than or equal to critical radius	CO2	3	
	6. $\frac{c_p . \mu}{K}$ is termed as the _____ number. a) Stanton b) Grashoff c) Prandtl d) Nusselt.	CO3	3	
Q 2	**Solve any two of the following**			3 * 2
(A)	What is thermal conductivity explain in detail?	CO1	1	
(B)	Derive equation for lumped parameter analysis	CO2	2	
(C)	Derive an energy equation for thermal boundary layer over flat plate	CO3	3	
Q 3	**Solve any one of the following.**			8
(A)	A exterior wall of a house may be approximated by a 0.1 m layer of common brick (k=0.7 W/m ^{0}C) followed by a 0.04 m layer of gypsm plaster (k=0.48 W/m ^{0}C). What thickness of loosely packed rock wool insulation (k=0.065W/m ^{0}C) should be added to reduce the heat loss or gain through the wall by 80%.	CO1	3	
(B)	Derive an expression for heat dissipation in straight triangular fin	CO2	2	

Course: B. Tech in Chemical Engineering   Semester: IV
Subject Name: CET-I
Subject Code: 20UCH402D
Max Marks: 20
Date:-   07-03-2024   Duration: 1 Hr.

Instructions to the Students:
1. Answer all the questions. Write down all parts of the question in same place.
2. Data book (clean copy) and calculator are allowed. Exchange of data book and calculator are not permitted.
3. Missing data may be suitably assumed, if any

			CO	BL	Marks
Q. 1					6x1

Q. 1

1. What is thermodynamics? — CO1, BL 2, Marks 1
   a) study of the relationship between heat and other forms of energy
   b) study of the conversion of chemical energy to other forms of energy
   c) study of the relationship between mechanical energy to other forms of energy
   d) study of the conversion of mechanical energy to other forms of energy

2. Heat flow into a system is ____, and heat flow out of the system is _____ — CO1, BL 1, Marks 1
   a) positive, positive   b) negative, negative   c) negative, positive   d) positive, negative

3. At a given temperature and pressure, a liquid mixture benzene and toluene is in equilibrium with its vapor. The available degree of freedom is — CO2, BL 1, Marks 1
   a) 0   b) 1   c) 2   d) 3

4. The internal energy of an ideal gas is a function of its _____ only. — CO2, BL 1, Marks 1
   a) Volume   b) Pressure   c) Temperature   d) Molecular size

5. An isolated system can exchange _____ with its surroundings. — CO1, BL 1, Marks 1
   a) Matter   b) Energy   c) Neither matter nor energy   d) Both matter and energy

6. In the equation, PV^n = Constant, if the value of n = 1, then it represents a reversible _____ process. — CO2, BL 2, Marks 1
   a) Isobaric   b) Isothermal   c) Isentropic   d) Adiabatic

Q.2   Solve Any Two of the following.   3 X 2

(A) What do you mean by the number of degrees of freedom? What is the number of degree of freedom when a binary liquid mixture is in equilibrium with its vapour? — CO2, BL 3, Marks 3

(B) What do you mean by a cycle process? State and explain the first law of cyclic process. — CO1, BL 3, Marks 3

(C) Explain the P-V-T behaviour of pure fluids with pressure verses volume diagram. — CO2, BL 3, Marks 3

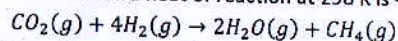**Q. 3   Solve Any One of the following.**   8x1

(A) (a) In a microscopic sense, what are the two characteristics of an ideal gas? How do you these features explain the dependency of the internal energy of an ideal gas on temperature alone? — CO2, BL 3, Marks 8
(b) Calculate the molar volume of gaseous methane at 300 K and 600 bar by the following methods using the ideal gas equation.

(B) For the following reaction the standard heat of reaction at 298 K is -164.987 kJ. — CO3, BL 3, Marks 8
$$CO_2(g) + 4H_2(g) \rightarrow 2H_2O(g) + CH_4(g)$$
The constant in the heat capacity equation ($C_p = \alpha + \beta T + \gamma T^2$) (J/mol K), are given below:

	α	β	γ
CO_2	26.75	42.26×10^{-3}	-14.25×10^{-6}
H_2	26.88	4.35×10^{-3}	-0.33×10^{-6}
H_2O	29.16	14.49×10^{-3}	-2.02×10^{-6}
CH_4	13.41	77.03×10^{-3}	-18.74×10^{-6}

Calculate the standard heat of reaction at 773 K.

*** Best of Luck ***