SDM College of Engineering and Technology

Department of Chemical engineering

The department assesses the learning levels of the students and conducts special programmes for slow learners.

Students at Chemical Engineering represent a combination of bright students and average students. To help them to cope up with the new learning environment, a number of measures are taken by the department for their betterment.

Parents are invited in the middle of semester to interact with concerned course instructors/ mentor to discuss the progress of their wards. Mentor-mentee relationship is followed in the department. The mentor maintains a Students' Record, to keep track of the records of the mentees. This is to help and to identify the slow learners from each batch of each year and every course. During the pandemic period slow learners were motivated and focused to concentrate on important questions in the entire respective subject and special hours were allotted through online mode. Each type of students has different learning attitudes and learning habits. The objective of such assessment process of the learning levels of the students is to identify the factors affecting the student's performance.

Every course instructor/mentor maintains a Students' record. Following records are to be maintained by Course Instructor/mentor of each class: (i) Student Information record (ii) Marks Statement (Internal Assessment and Semester End Exams) (iii) List of slow learners of their batch. (iv) Remedial measures are taken and details (circulars and notices) (v) Records of activities.

SDM College of Engineering and Technology, Dharwad. Department of Chemical Engineering Circular 20/04/2021

All the faculty members are asked to submit the list of slow learners those who scored (below 10) in internal tests to the concerned class advisors for the special coaching classes that are planned to be conducted from 03/05/2021 to 29/06/2021.

Class advisors are requested to submit the consolidated slow learners based on the previous Internal Assessment, Attendance, Assignments/quizzes.

On the day of coaching classes, the faculties should,

- 1. Coach the important questions to the students and should conduct the class test.
- 2. Provide the supplementary study Materials.
- 3. Pay individual attention to the slow learners.
- 4. The Attendance should be submitted to the HoD after the coaching class.
- 5. Create ability in the students to answer the questions in class.
- 6. To create general awareness amongst students about their improved performance in

academics.

7. To Increase attentiveness in class.

H.O.D. Department of Chemical Engineering SDM College of Engg & Technology, Dharwad-580 002

SDM COLLEGE OF ENGINEERING & TECHNOLOGY, DHARWAD Department of Chemical Engineering

Academic Year: 2020-21

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				TIME TA	BLE (EVEN	SEMESTER)			
Class: IV Sen	1	Lab Batches:	B1(2SD17C)	H002 to 2SD19		2SD19CH010 to		С	lass Room: 16
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Tuesday		EM-IV	X	РНТ	CET	CRE-I		CET(SLC)	CRE-I(SLC)
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Friday	PCE	CET		EM-IV	CRE-I	ET&M	TUN		
Saturday	4		FM Lab / B1)	>	PCE				

NOTE: This time table will be in force from 15-03-2021

Course Code	Course Title	Credits	Course Instructor
18UMAC400	Engineering Mathematics - IV	3	Prof. Shreekant Kanguri
18UCHC400	Process Heat Transfer	4	Prof. Shivanand. Y.A
18UCHC401	Chemical Reaction Engineering-I	4	Prof. Shivanand. Y.A
18UCHC402	Chemical Engineering Thermodynamics	4	Dr. Rashmi. S.H
18UCHC403	Pollution Control Engineering	3	Dr. Lokeshwari N
18UCHC404	Energy Technology and Management	3	Prof. Kirankumar Rathod
18UCHL405	Computational Methods & Simulation Laboratory	1.5	Prof. Kirankumar Rathod
18UCHL406	Fluid Mechanics Laboratory	1.5	Dr. Rashmi. S.H/ Dr. Lokeshwari N
18UCHL407	Introductory Project	1	Prof. Shivanand. Y.A/ Dr. Keshava Joshi
	Total Credits offered	25	

• SLC + Slow learner classes

Staff effarge

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SDM COLLEGE OF ENGINEERING & TECHNOLOGY, DHARWAD Department of Chemical Engineering

Academic Year: 2020-21

Lab Batches: B1(2SD17CH007 to 2SD18CH011) Class: VI Sem B2(2SD18CH012 to 2SD18CH031) Class Room: Dept. seminar Hall 8-00am 9-00am 10-00am 10-30am 1-30 pm 2-30 pm 3-30pm 11-30am 12-30pm Days to to to to to to to to to 9-00am 10-00 am 10-30am 11-30 am 1-30 pm 2-30 pm 3-30 pm 4-30 pm 12-30 pm Monday TP **CED-II** OE Minor Project - 2 -> + _ -----MT/CRE Lab Tuesday OE **CED-II** MT-II(SLC) (B1/B2) LUNCH BREAK (2.00pm to 5.00pm) TEA BREAK Minor Wednesday MT-II OE Minor Project - 2 TP СТ Project - 2 MT/CRE Lab TP Thursday MT-II PU&IS (B1/B2) (2.00pm to 5.00pm) Soft Skills/Aptitude ----TP(SLC) PU&IS СТ MT-II Friday СТ PU&IS Saturday MT-II

TIME TABLE (EVEN SEMESTER)

NOTE: This time table will be in force from 15-03-2021

Course Code	Course Title	Credits	Course Instructor
18UCHC600	Mass Transfer - II	4	Dr. Keshava Joshi
18UCHC601	Chemical Equipment Design - II	4	Dr. Keshava Joshi
18UCHL602	Mass Transfer Laboratory	1.5	Prof. S.S. Inamdar/Dr. Keshava Joshi
18UCHL603	Chemical Reaction Engineering Laboratory	1.5	Prof. Ashoka. H.S/Prof. Shivanand. Y.A
18UCHL604	Minor Project - 2	2	Prof. Ashoka. H.S
18UHUL605	Soft Skills/Aptitude	1	
18UCHE606	Transport Phenomena (Elective)	3	Dr. Lokeshwari N
18UCHE607	Catalyst Technology (Elective)	3	Prof. Ashoka. H.S
18UCHE608	Plant Utilities and Industrial Safety(Elective)	3	Prof. S.S. Inamdar
18UCHO613	Biology for Engineers (Open Elective)	3	Prof. Kirankumar Rathod
	Total Credits offered	26	

• SLC - Slow learner classes

Staff In charge

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Attendance sheet for Slow Learner Classes

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SDM College of Engineering and Technology, Dharwad.

Department of Chemical Engineering

Numericals solved for slow learners

Sem: IV Sub: Chemical Engineering Thermodynamics

1. How many degrees of freedom has each of the following systems?

i) Liquid water in equilibrium with its vapor

ii) Liquid water in equilibrium with a mixture of water vapor and nitrogen

A liquid solution of alcohol in water in equilibrium with its vapor

2. Liquid water at 180°C and 1002.7 kPa has an internal energy (on an arbitrary scale) of 762 kJ/kg and a specific volume of $1.128 \text{ cm}^3/\text{g}$.

i)What is its enthalpy?

ii) The water is brought to the vapor state at 300°C and 1500 kPa, where its internal energy is 2784.4 kJ/kg and its specific volume is 169.7 cm³/g. Calculate ΔU and ΔH for the process.

3. Calculate ΔU , ΔH , W and Q for the following processes:

i) An ideal gas is expanded from 5 bar to 4 bar isothermally at 600 K.

ii) An ideal gas contained in a vessel of 0.1 m³ capacity is initially at 1 bar and 298 K. It is heated at constant volume to 400 K. Assume $C_P=30$ J/mol K.

4. An ideal gas undergoes the following reversible processes:

i) From an initial state of 343 K and 1 bar it is compressed adiabatically to 423 K

ii) It is then cooled to 343 K at constant pressure

iii) Finally, it is expanded to its original state isothermally.

Calculate ΔU , ΔH , Q and W for each step as well as for the entire cycle.

Assume $C_V = (3/2)R$.

5. Calculate ΔU and ΔH for 1 kg of water when it is vaporized at the constant temperature of 100°C and the constant pressure of 101.325 kPa. The specific volumes of liquid and vapour water at these conditions are 0.00104 and 1.673 m³/kg. For this change, heat in the amount of 2256.9 kJ is added to the water.

6. An ideal gas undergoes the following reversible processes:

(i) From an initial state of 343 K and 1 bar it is compressed adiabatically to 423 K.

(ii) It is then cooled to 343 K at constant pressure.

(iii) Finally it is expanded to its original state isothermally.

Calculate ΔU , ΔH , W and Q for each step. Assume $C_V = (3/2)R$.

7. An ideal gas which was initially at 1 bar and 280 K is compressed to 5 bar and 280 K by two different reversible processes:

i) Cooling at constant pressure followed by heating at constant volume

ii) Heating at constant volume followed by cooling at constant pressure

For each of the above paths, determine the conditions at the intermediate state and ΔU , ΔH , Q and W. The heat capacities are $C_V = 20.786 \text{ kJ/kmol.K}$ and $C_P = 29.1 \text{ kJ/kmol.K}$

8. Determine the molar volume of gaseous methane at 300 K and 600 bar by the following methods:

- i) Using the ideal gas equation
- ii) Using the van der Waals equation given that $a = 0.2285 \text{ N m}^4/\text{mol}^2$; $b = 4.27 \times 10^{-5} \text{ m}^3/\text{mol}$
- iii) Using the Redlich Kwong equation given that $T_C = 191.1$ K and $P_C = 46.4$ bar.

9. The standard heat of combustion of graphite at 298 K is - 393.778 kJ/mol. Determine the heat of combustion at 800 K. The heat capacities in J/mol K are:

Carbon: $11.19 + 1.096 \times 10^{-2} \text{ T} - 4.894 \times 10^{5} \text{ T}^{-2}$

Oxygen: $34.62 + 1.08 \times 10^{-3} \text{ T} - 7.859 \times 10^{5} \text{ T}^{-2}$

Carbon dioxide: $43.29 + 1.147 \times 10^{-2} \text{ T} - 8.185 \times 10^{5} \text{ T}^{-2}$

10. A nuclear power plant generates 750 MW; the reactor temperature is 315°C and a river with water temperature of 20°C is available.

- i) What is the maximum possible thermal efficiency of the plant, and what is the minimum rate at which heat must be discarded to the river?
- ii) If the actual thermal efficiency of the plant is 60 % of the maximum, at what rate must heat be discarded to the river, and what is the temperature rise of the river if it has a flow rate of $165 \text{ m}^3 \text{s}^{-1}$?

11. The work output from a Carnot engine operating between two thermal reservoirs at 500 K and 300 K respectively, is utilized by a Carnot refrigeration machine for absorbing heat at the rate of 4 kJ/s from a cold room at 270 K and discarding heat to the surroundings at 300 K. Determine the quantity of heat absorbed by the engine at 500 K. If the COP of the refrigerator and the efficiency of the engine are two-third of the ideal values, what is the quantity of heat absorbed by the engine at 500 K?

Attendance sheet for Slow Learner Classes

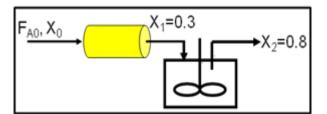
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Theory/Numericals solved for slow learners in the class

Sem: IV

Sub: Chemical Reaction Engineering-I

- 1. Interpretation of batch Reactor data- theory with numerical problems.
- a) At 380°C, the half-life period for the first order decomposition of H_2O_2 is 360 min. the energy of activation of the reaction is 200kJ mol⁻¹, Calculate (i) rate constant at 450°C and (ii) the time required for 75% decomposition at 450°C.
- b) The rate law for the reaction, 2Cl₂O → 2Cl₂ + O₂ at 200°C is found to be : rate=k[Cl₂O]²
 (a)How would the rate change if [Cl₂O] is reduced to one-third of its original value?
 (b)How should the [Cl₂O] be changed in order to double the rate?
- 2. Reactor designs- Batch, PFR,CSTR advantages and disadvantages with features, design equation. Problems.
- a) The elementary, irreversible liquid-phase reaction A B + C is carried in a CSTR (orginal reactor) and the conversion of 70% is achieved. You have two new reactors that are each exactly half the size of the original CSTR to replace the original CSTR. If the two new reactors are used in series and the feed conditions remain identical to those for the original reactor, total conversion achieved in the 2–reactor chain.
- b) Calculate the reactor volumes shown below for the reaction data in the table when the molar flow rate is 52 mol/min. $-r_A$ is in terms of mol/m³.s



- 3. Multiple reactions theory and derivation with problems.
- a) Liquid reactant A (C_{Ao}=2) decomposes as per the reactions $A \leftarrow D = D = D$ with $r_B = 1$, $r_C = 2C_A$, $r_D = C_A^2$. Determine maximum concentration of desired product that can be obtained in MFR
- b) A→B reaction is carried in two reactors. Calculate the volume of reactors for the configuration where PFR with conversion of 30% is followed by MFR with 80% conversion of A connected in series. The molar flow rate is 52 mol/min. Following are conversion and rate data obtained in the laboratory.
- 4. Revision and clearing doubts in the class.

Slow Learner Classes for the year 2021-22

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Slow Learner Classes 2020-21

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Slow Learner Classes 2019-20

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28	25018CH020	Namerata Badigannaval	08	12	13	08	33		n sale
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*		Priyanka Kurdikeri	06	12	07	08	27		Shrive
30		Shashank Baligas	Ab	07	09	08	24		Ke
34	25D18CH003	Appasal Waghamore	09	04	13	08	30		Her
*	25D17CH007	Mahadein Bijali	06	Ab	09	07	22		And
3	25017CH023	Venkatesh Rayala	06	08	08	07	23		unt

STUDENTS' COURSE RECORDS:

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Slow Learner clarses I sem solution Thermodymamics Academic Year 2019-20 STUDENTS' COURSE RECORDS: Continuous Internal Evaluation

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Classifier Slows Learners. Sub: Catalyst Technology, 2019-2020, Sem: VI

STUDENTS' COURSE RECORDS: Continuous Internal Evaluation **Continuous Internal Evaluation (CIE)**
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Slow Learner Classes 2018-19



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SLOW LEARCH	-19 CPUS 15UCHCS	(2.30 pm-3.30 pm) 2018-19 STUDENTS' COURSE RECORDS: Attendance
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QUESTIONS

ACADEMIC YEAR: 2018-19

SUB: CHEMICAL PLANT UTILITIES AND SAFETY Code: 15UCHC503 Sem: V

- 1. Highlight briefly on any five considerations to be made for the selection of an utility in a chemical plant.
- 2. What are the reasons for a boiler to corrode? Further, interpret briefly on the methods used in the degasification of boiler feed water.
- 3. With a neat flowsheet, explain the industry water circuit.
- 4. Explain the use and distribution of steam citing direct applications and in process reactions.
- 5. Citing chemical reactions, explain hot lime soda process used in the treament of boiler feed water.
- 6. Using a T-S diagram, show that the COP of a refrigerator depends only on the temperature levels and is independent of working fluid.
- 7. Write on the refrigerants, the types and *any four* properties considered for their selection.
- 8. Interpret briefly on *any four* factors that contribute to the special process hazards.
- 9. Reproduce a neat sketch showing main parts of a reciprocating air compressor and giving one *line* importance of each component part.
- 10. With a neat flow sheet labeling all the components, represent the process of dehydration of air by PSA. State one line importance of each component part used?

Case studies: Bhopal Gas tragedy, Flixborough disaster, Seveso disaster etc.

SLOW	LEARNERS (ERtra Claus) 3-19) BCE ISUCHEFOD	2:30-3:30 pm (Thinsday)
(2018	-19) BCE ISUCHETO2	STUDENTS' COURSE RECORDS: Attendance
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58 14C4012Wlegha 59 60 61		60 61 62

QUESTIONS

ACADEMIC YEAR: 2018-19

SUB: BIOCHEMICAL ENGINEERING Code: 15UCHC702 Sem: VII

Describe the following:

- 1. Cell structure (prokaryotesand eukaryotes) Figure
- 2. Cell fractionation technique
- 3. Control of microrganisms
- 4. Struture of DNA
- 5. Carbohydrates and lipids
- 6. Michaelis Menten kinetics
- 7. Evaluation of parameters
- 8. Inhibition kinetics
- 9. Immobilized enzyme technology
- 10. Monod's growth kinetics

- 11. Cell culturing
- 12. Transient growth kinetics
- 13. Reactors and their configurations
- 14. Operation and maintenance of typical aseptic aerobic fermentation process
- 15. Product recovery operations (sequence)

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Slow Learner Classes 2017-18

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