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(21214) Roll No. ....

B.Tech.-V Sem.

TU-107(N)

B. Tech. Examination, Dec. 2014

C-E Branch

Computer Based Numerical Methods

BT-521(N)

Time : Three Hours] *[Maximum Marks : 100*

Note : Attempt any **five** questions. Each question carries 20 marks.

1. (a) Find rate of convergence of Newton Raphson's method.

   (b) Using Regula falsi method find root of $x^3-5x+3=0$

2. Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by

   (i) Simpson's $\frac{1}{3}$ Rule.

   (ii) Simpson's $\frac{3}{8}$ Rule.

P.T.O.

3. Prove that

(i) $\Delta^4 y_0 = y_4 - 4y_3 + 6y_2 - 4y_1 + y_0$

(ii) $E = \Delta + I$, where E is shifting operator and Δ is the Forward difference operator.

4. Solve the following system of equations using Gauss-Seidel iterative method.

$$10x+y+2z=44$$

$$2x+10y+z=51$$

$$x+2y+10z=61$$

5. Solve the equations

$$10x_1-x_2+2x_3=4$$

$$x_1+10x_2-x_3=3$$

$$2x_1+3x_2+20x_3=7$$

Using Gauss Elimination method.

6. (a) Find the missing values in the table

x :	45	50	55	60	65
y :	3	-	2	-	-3

(b) Use Lagrange's interpolation formula to fit a polynomial to the data :

x :	−1	0	2	3
ux :	−8	3	1	12

7. Apply Runge-Kutta fourth order to solve

$\frac{dy}{dx} = \frac{x^2+y^2}{10}$, for x = 0.2.

given y(0)=1, h=0.1

8. Find y(2) if y(x) is the solution of

$\frac{dy}{dx} = \frac{1}{2}(x+y)$, where y(0) = 2

y(0.5) = 2.636, y(1)=3.595

y(1.5)=4.968. Use Milne's method.

9. Find the largest eigen value and corresponding eigen vector of the matrix using power method

$$\begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$$

Initial eigenvector is [1,0,0]

10. Discuss the following :

(a) Errors in numerical computations

(b) Finite difference method

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B.Tech.-V Sem.

TU-108 (N)

B.Tech. Examination, Dec - 2014

C.E. BRANCH

Mass Transfer Operations - I

BT-522 (N)

Time : Three Hours] *[Maximum Marks : 100*

Note: Answer any **five** questions. **All** questions carry equal marks.

1. (a) What is diffusion? State the Fick's law of diffusion. 10

   (b) Describe the two film theory of inter-phase transport. 10

2. (a) Give the difference between mass transfer rate, mass transfer flux and mass transfer coefficient. 10

P.T.O.

(b) How does the mass transfer coefficient vary with superficial velocity in case of a fluidized bed. 10

3. (a) Explain the choice of solvent of gas absorption. 10

(b) Obtain the equation of operating line. 10

4. (a) What is the difference between HTU, NTU and HETP? 10

(b) A gas is to be washed by solvent. How will you determined the minimum solvent required. 10

5. (a) Define Absolute humidity and Relative humidity. 10

(b) Give the design procedure of determining of cooling tower. How to make use of Psyhrometric chart of the purpose? 10

6. (a) Describe the operation of batch and continous dryers. 10

(b) Explain the theory of wet bulb temperature. 10

7. (a) Define "Drum Dryer" with showing their advantages and disadvantages. 10

(b) Give the classification of various crystallisers. 10

8. (a) Describe the various stage of Crystal growth. 10

(b) A wet solid is dried from 35% to 10% moisture under constant drying conditions in 5 hrs. If the equilibrium moisture content is 4% and the critical moisture content is 14%, How long will take to dry 6% moisture under the same conditions? 10

9. (a) Discuss the Role of Surface Reaction and mass transfer in determining the crystal growth. 10

(b) What is magma? Explain the various effects of impurities on crystal formation. 10

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B.Tech. V Sem.

TU-109(N)

B.Tech. Examination, Dec. 2014

C.E. Branch

Chemical Reaction Engg. II

BT-523(N)

Time : Three Hours] *[Maximum Marks : 100*

Note: Attempt any **Five** questions. **All** questions carry equal marks.

1. (a) Describe catalytic heterogeneous and non-catalytic heterogeneous reaction with example. 5

   (b) Discuss industrial reactor best suited for fluided bed operation. 5

   (c) Define homogeneous catalysis. 5

P.T.O.

(d) Differentiate between selectivity and yield. 5

2. (a) Write short note on Instantaneous reaction with respect to mass transfer. 5

(b) Define enhancement factor in relation to non-catalytic fluid-fluid reaction. 5

(c) Describe catalyst selection. 5

(d) Define catalysit parisoning. 5

3. (a) Derive the Michaelis-menten Equation for enzyme fermentation. 10

(b) Describe the kinetics of competitive and non-competitive inhibition. 10

4. (a) A feed consisting 30% of 50 nm radious particle 40% of 100 nm radious particle and 30% ot 20 nm radious particle is to be fed continuously in thin layer onto a moving grate cross current to a flow of reactent gas. For the planned operating

condition the time required for complete conversion is 5, 10 and 10 mins. Find the conversion of solid on the grate for a residence time of 8 min. 10

(b) Reaction rate double for a 10 degree rise in tempreture. what is activation energy for the reaction. 10

5. (a) Differentiate between shrinking core model and progressive-conversion model. 10

(b) Derive equation for diffusion through Gas film controls. 10

6. (a) Derive performance equation for reactor containing proces catalyst particle. 10

(b) Describe thief modulus for first order reaction and effectiveness factor. 10

7. (a) Explain microbial fermentation and pallymerization reactors. 10

(b) Explain how would you design an isothermal packed bed reactor using integral kinetic data.Write the performance equation. 10

8. (a) What is catalyst deactivation? How and why it occurs? What are the factors that are responsible for deactivating a procces catalyst pellet. 10

(b) The Following kinetic data on the solid catalysed reaction $A \rightarrow 3R$ are obtained, in a basket type of mixed flow reactor 960 Cm 3 in volume and containing i g of catalyst, by conducting runs at Qtm and 700 °C using pure A as feed.

Kinetic data: The partial pressure of A in the exit stream at variation feed rates.

Feed rate l/h	100	22	4	i	.60
PA out/PA in	0.8	0.5	0.2	0.1	0.05

Find the rate equation for this reaction 10

9. Define the following: 20

(i) Molecular seive catalyst

(ii) Porous catalyst

(iii) Optimum tempreture progression

(iv) Hot sopt in tubular reactor.

10. (a) Define the following: 10

(i) Cold shot cooling

(ii) Cold inert injection

(iii) Adsorption isotherm

(iv) Effective diffusivity

(b) Substrate A and enzyme E flow through a mixed flow reactor of volume (v) 6l. Find a rate equation to represent the action of enzyme on the substrate using the following data 10

C_{EO}, Mol/l	C_{AO}, mol/l	C_A, mol/l	v, l/h
0.02	0.20	0.04	3
0.01	0.30	0.15	4
0.001	0.69	0.60	1.2

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B.Tech. V Sem.

TU-110(N)

B.Tech. Spl. Examination, Dec. 2014

Chemical Technology - II

BT-524(N)

Time : Two Hours] *[Maximum Marks : 50*

Note : Attempt any **five** questions. **All** questions carry equal marks.

1. Write short note on any **two** of the following: 10
   (i) Low pressure type liquid oxygen plant
   (ii) Thermodynamic concept behind liquefaction of gases.
   (iii) Membrane Separator

2. Discuss with a flow sheet a suitable process for the production of caustic-soda & chlorine. 10

P.T.O.

3. (a) What are the main sources of "Phosphorus" in India?

(b) What are the different process of phosphoric acid manufacturing? 5+5

4. Discuss the sequence of reactions occurring in the rotary kiln for the formation of clinker componds of portland cement. 10

5. What are the major "NPK" fertilizers & their nutrient%? 10

6. What are the different feed stocks for sulphuric acid manufacturing? 10

7. What are different process of "Nitric acid" manufacturing? 10

8. Explain the chemistry of the process for nitric acid manufacture. 10

9. Explain manufacturing of Ammonia with flow diagram. 10

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B.Tech. V Sem.

TU-111(N)

B.Tech. Examination, Dec. 2014

C. E. Branch

Process Instrumentation

BT-525 (N)

Time : Two Hours] *[Maximum Marks : 50*

Note : Attempt any **five** questions. **All** questions carry equal marks.

1. (a) Define the term instrumentation and give the classification of instruments. 5

   (b) Explain clearly the difference between primary and secondary working standards. 5

P.T.O.

2. Distinguish between and give appropriate example in each case - 10

(i) Range & Span.

(ii) Error & Accuracy.

(iii) Hysteresis & Dead Zone.

(iv) Threshold & Resolution.

(v) Drift & Reproducibility.

3. Explain liquid-in-glass thermometer with a neat sketch and give its applications. 10

4. What do you mean by Radiation Pyrometer? Give their merits and demerits. 10

5. Describe in detail all the types of manometers with figure. 10

6. Explain the working principle of Bourdon tube pressure gauge with a neat diagram. Also give their advantages. 10

7. What do you mean by orifice flow meter? Write down their advantages and limitations. 10

8. Explain the following in detail - 10

(a) Say bolt Viscometer.

(b) Nelod Gauge with limitations.

9. Describe in detail the dynamic characteristics of instruments. Explain fidelity & dynamic error. 10

10. Classify various types of temperature measurement instruments. Explain any one with neat sketch. 10