MID SEM EXAM - MARCH 2018

Enrolment No: 145
R110217145

UPES

Course: CHEM-1001 – Chemistry

Programme: B.Tech. APE- UP, Civil, Mechanical, Mechatronics, ADE, GSE, GIE, Mining, FSE, CS-CCVT, CS-Big Data, CS-O&G, CS-IOT, CS-MFT, CS-OSS, CS-MC, CS-GG

Semester: II(2017-18)

Time: 02 hrs. **Max. Marks:100**

Instructions: Read all the below mentioned instructions carefully and follow them strictly

1) Write your Enrolment No. at the top of the question paper
2) Do not write anything else on the question paper except your roll number
3) ATTEMPT ALL THE PARTS OF A QUESTION AT ONE PLACE ONLY
4) Internal choice is given for question number 12
5) CO1, CO2, CO3 & CO4 in the last column stand for course outcomes and are for official use only

Section - A (attempt all **FIVE** Questions)

1.	PCl_5 is 10% dissociated at particular temperature and under pressure of 4 atm, Calculate the pressure at which PCl_5 will be 20% dissociated at the same temperature.	[4]	CO3
2.	Explain: Acid correction is subtracted and cooling correction is added in the calculation of calorific value by bomb calorimeter.	[4]	CO1
3.	Explain the mechanism of pearl or bead polymerization technique.	[4]	CO2
4.	0.6 g of an organic compound was kjeldahlised and the evolved ammonia was absorbed in 90 ml N/9 H_2SO_4. The excess of acid for complete neutralization required 20 ml N/10 NaOH. Calculate the percentage of nitrogen in the compound.	[4]	CO4
5.	Explain graft and cross-linked polymer with neat diagram and compare their strength.	[4]	CO2

SECTION - B (Attempt all **FIVE** Questions)

6.	Give reasons: a) Viscosity increases dramatically in bulk polymerization. b) Suspension polymerization is economical. c) Surfactants are added in emulsion polymerization. d) GCV of a fuel is always greater than NCV.	[8]	CO2

7.	**i)** Write short note on conducting polymer with suitable example. **ii)** Differentiate addition and condensation polymerization.	[4+ 4]	CO2
8.	The percentage composition by mass of coal sample is as follows: C=75%, H=6.5%, O=5%, N=2%, S=2.5%, and rest=ash% Calculate the volume of oxygen and air required at 27^0C and 750 mm of Hg pressure for the combustion of 1Kg of coal.	[8]	CO3
9.	**i)** The decomposition of Cl_2O_7 at 400K in gas phase into Cl_2 and O_2 follows first order kinetics. After 55 sec at 400K, the pressure of Cl_2O_7 falls from 0.062 to 0.044 atm. Calculate the rate constant and pressure of Cl_2O_7 after 100 sec. **ii)** On burning 0.76 g of a fuel in a bomb calorimeter, the temperature of 3250 g of water increased from 26.2°C to 28.4°C. Water equivalent and latent heat of steam are 385.0 and 587.0 cal/g respectively. If the fuel contains 0.8 % hydrogen, calculate gross and net calorific value.	[4+ 4]	CO3
10.	For the reaction A +B →C, the following data were obtained: In the first experiment, when the initial concentration of both A and B are 0.1 M, the observed initial rate of formation of C is 1×10^{-4} mol litre^{-1}minute^{-1}. In second experiment when the initial concentrations of A and B are 0.1 M and 0.3 M, the initial rate is is 9×10^{-4} mol litre^{-1}minute^{-1}. In the third experiment when the initial concentrations of both A and B are 0.3 M, the initial rate is 2.7×10^{-3} mol litre^{-1}minute^{-1}. Write rate law for this reaction and also calculate the rate constant.	[8]	CO4

SECTION - C

(Question No. 11 is Compulsory; Attempt any one from question numbers 12A & 12B)

11.	**i)** For the thermal decomposition of N_2O, the proposed mechanism is $N_2O \xrightarrow{K1} N_2 + O$ $O + O + M \xrightarrow{K2} O_2 + M$ $O + N_2O \xrightarrow{K3} N_2 + O_2$ $O + N_2O \xrightarrow{K4} 2NO$ Derive the rate laws in terms of N_2O. **ii)** The heat of neutralization of a strong acid with a strong base is – 57.36 kjmol^{-1}. If the heat of neutralization of a weak acid HA with a strong base be -42.02 kjmol^{-1}. Calculate the heat of ionization of the weak acid. **iii)** Calculate the C-C bond energy from the following data: $C_{(s)} \rightarrow C_{(g)}$ $\Delta H = 170.9$ kcal $H_2 \rightarrow 2H_{(g)}$ $\Delta H = 104.2$ kcal Heat of formation of ethane= -20.3 kcal C-H bond energy = 99 kcal	[8+5+7]	CO3 CO1 CO3

12A.	**i)** Discuss the effect of inert gas at constant pressure and constant volume on extent of reaction at equilibrium. **ii)** Olefins and aromatics have high octane number but their content is restricted in the composition of fuel. Why? **iii)** A reaction proceeds with five times more speed at 60°C as it does at 30°C. Calculate its energy of activation.	[8+5+7]	CO1 CO2 CO3
12B.	**i)** Discuss the effect of pressure, temperature and concentration on equilibrium. **ii)** Calculate the heat of formation of sulphuric acid from the following data: $S(s) + O_2(g) \rightarrow SO_2(g)$ $\Delta H = -70.96$ kcal $SO_2(g) + \frac{1}{2} O_2(g) \rightarrow SO_3(g)$ $\Delta H = -23.49$ kcal $SO_3(g) + H_2O(l) \rightarrow H_2SO_4(l)$ $\Delta H = -31.14$ kcal $H_2(g) + \frac{1}{2} O_2(g) \rightarrow H_2O(l)$ $\Delta H = -68.40$ kcal **iii)** At 25°C and 1 atmospheric pressure, the partial pressure in equilibrium mixture of gaseous N_2O_4 and NO_2 are 0.7 and 0.3 atm respectively. Calculate the partial pressures of these gases when they are in equilibrium at 25°C and a total pressure of 10 atm.	[8+5+7]	CO1 CO2 CO3

Roll No: 145

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UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

Mid Semester Examination, March 2018

Programme: B.Tech (All SCS Programs) | **Semester – II**

Course Name: Mathematics-II | **Max. Marks : 100**

Course Code: MATH 1005 | **Duration : 2 Hrs**

No. of page/s:2

Section A
(Attempt all questions)

		MARKS	
1.	Find the value of the constant k if the equation $y'' + 2y' + 5y = 8\sin x + 4\cos x$ has the particular integral $y_p = k\sin x$.	[5]	CO1
2.	Find the solution of the differential equation $(y - x^2)\,dx + (x^2 coty - x)dy = 0.$	[5]	CO1
3.	The diameter of an electric cable, say X, is assumed to be a continuous random variable with probability density function ($p.d.f$) given by $f(x) = 6x(1-x), 0 \le x \le 1.$ Find the value of b such that $P(X < b) = P(X > b)$	[5]	CO2
4.	Given that X has moment-generating function $M_X(t) = \frac{1}{6}e^{-2t} + \frac{1}{3}e^{-t} + \frac{1}{4}e^{t} + \frac{1}{4}e^{2t}$. Find $P(\lvert X\rvert \le 1)$.	[5]	CO2

SECTION B
(Attempt all questions)

5.	Solve the equation $(3x+2)^2\frac{d^2y}{dx^2} + 3(3x+2)\frac{dy}{dx} - 36y = 3x^2 + 4x + 1.$	[10]	CO1
6.	Solve $y_2 - 4y_1 + 4y = 8x^2e^{2x}\sin 2x$	[10]	CO1
7.	A manufacturer, who produces medicine bottles, finds that 0.1% of the bottles are defective. The bottles are packed in boxes containing 500 bottles. A drug manufacturer buys 100 boxes from the producer of bottles. Using Poisson distribution, find how many boxes will contain (i) no defective and (ii) at least two defectives.	[10]	CO2

8.	Explain the method of *removal of the first derivative* to solve the differential equation $$y'' + P(x)y' + Q(x)y = R(x).$$	[10]	CO1

SECTION C
(Q9 is compulsory and Q10A, Q10B have internal choice)

9.A	Solve $\frac{d^2y}{dx^2} - \cot x \frac{dy}{dx} - (1 - \cot x)y = e^x \sin x$ by finding a part of the complementary function.	[10]	CO1
9.B	Make use of the following distribution table to compute the *moment coefficient of skewness*:	[10]	CO2

Classes	2.5-7.5	7.5-12.5	12.5-17.5	17.5-22.5	22.5-27.5	27.5-32.5	32.5-37.5
Frequency	8	15	20	32	23	17	5

10.A	Solve the following differential equation $$\frac{d^2y}{dx^2} + (3\sin x - \cot x)\frac{dy}{dx} + 2y\sin^2 x = e^{-\cos x}\sin^2 x.$$ **(OR)** Solve the equation $\frac{d^2y}{dx^2} + a^2y = \tan ax$.	[10]	CO1
10.B	Construct a binomial distribution fit for the following data and obtain the theoretical frequencies.[*Hint: Here* $n = 5$]	[10]	CO2

x_i	0	1	2	3	4	5
Frequency, f_i	2	14	20	34	22	8

(OR)

The income of a group of 10,000 persons was found to be normally distributed with mean ₹750 per month and standard deviation ₹50. Solve for the percentage of persons whose income is exceeding (i) ₹ 668 and (ii) ₹ 832. (Given the area under the standard normal curve between $z = 0$ *and* $z = 1.64$ *is* 0.4495)

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Roll No: R110218145

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UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

Mid Semester Examination, March 2018

Programme: B.Tech CSE (All IBM Branches) | **Semester – II**
Course Name: Database Management Systems | **Max. Marks : 100**
Course Code: CSEG 1005 | **Duration : 2 Hrs**
No. of page/s: 2

All questions are compulsory from section A & C and attempt any 3 questions from Section B.

Section – A

Q1.(a).Define cardinality of a relation. Give example. [2 + 2 + 3]

(b). Explain Codd's Rule.

(c).Write an expression in relational algebra to retrieve all the records of employee having salary greater than 500000.

Q2.(a). Distinguish between Delete and Drop statement. [2 + 2 + 3]

(b). Write the critical success factors in database design.

(c). State differences between Network and Hierarchical Model?

Q3.State the differences between DBMS over file processing system? [8]

Q4.(a). Create an ER model of Hospital Management System, where we have patient employee, nurse, doctor, record etc. as various entities. [4 + 4]

(b). Explain the Three level schema architecture of DBMS.

Section – B

Q5.What is the difference between logical data independence and physical data independence? Which one is harder to achieve? Why? [15]

[5 + 10]

Q6.(a). Explain the terms primary key, candidate key, super key and foreign key. Give an example for each.

(b). State the meaning of key attribute, multivalued attribute, composite attribute and derived attribute along with their symbols and give one example for each.

[15]

Q7. State the differences between Data and Information? What do you mean by DBMS? Why we need it and explain the major characteristics of database approach?

OR

[15]

Q8. Consider the following relational schemas:

EMPLOYEE (EMPLOYEE_NAME, STREET, CITY)
WORKS (EMPLOYEE_NAME, COMPANY_NAME, SALARY)
COMPANY (COMPANY_NAME, CITY)

Give an expression in SQL for each of queries below:

(i) Find the names of all employees who work for "first Bank Corporation".
ii) Find the names and company names of all employees sorted in ascending order of company name and descending order of employee names of that company.
iii) Change the city of 'First Bank Corporation' to 'New Delhi'.
iv) Add a column name DOB in EMPLOYEE schema.
v) Modify a column name SALARY to EMP_SALARY in WORKS schema.

Section – C

[25]

Q9. Create an Entity Relationship diagram that captures this information about the UPS system. Be certain to use proper symbols, indicate identifiers and cardinality constraints?

UPS is a shipping agency. UPS prides itself on having up-to-date information on the processing and current location of each shipped item. To do this, UPS relies on a company-wide information system. Shipped items are the heart of the UPS product tracking information system. Shipped items can be characterized by item number (unique), weight, dimensions, insurance amount, destination, final delivery date and derived attribute time remaining to deliver product. Shipped items are received from single retail center. Retail centers are characterized by their type, unique ID, and address. Shipped items make their way to their destination via one or more standard UPS transportation events (i.e., flights, truck deliveries). These transportation events are characterized by a unique scheduleNumber, a type (e.g, flight, truck), and a DeliveryRoute which may have more than one routes.