

Sr. No 9428(S)

Roll No. _____

B.SC. (NON-MEDICAL)- 4th SEMESTER EXAMINATIONS, OCTOBER-2017
(SUBJECT-PROGRAMMING IN C AND NUMERICAL METHODS)
(PAPER CODE- 09010403)

Time : 03:00 Hours

Maximum Marks – 40

Instruction :

1. Write your Roll No. on the question paper.
2. Candidate should ensure that they have been provided with correct question paper. Complaints in this regard, if any, should be reported to the invigilator on duty in the examination hall within 15 minutes of the commencement of the exams. No complaints shall be entertained thereafter.
3. Attempt five question in all. Question No.01 is compulsory. Student are required to Attempt one question from each unit.
4. Draw diagram whenever required.

Q1 . a) What is the output of this C code?

(4X2=8)

```
#include <stdio.h>
int main ()
{
int x = 2;
x =x <<1;
printf(“%d\n”,x);
}
```

- b) if a root $f(x) = 0$ lies between 2 and 3, how many iterations of bisection method are needed to find the root upto 1 decimal places?
- c) Find cube root of 9 correct upto 2 decimal places by using the Newton Raphson method.
- d) Show that one root of the equation $x^2 = \cos(x)$ lies in the interval (0,1).

UNIT-I

Q2 . a) Write a C program for multiplication of two matrices of any order.

(4)

b) Draw flow chart to reverse a four digit number.

(4)

Q3 . a) What is the difference between call by value and call by reference. Explain with the help of example.

(4)

b) Write a C function to find maximum of three integers.

(4)

UNIT-II

Q4 . a) Discuss order of convergence of Newton Raphson’s method.

(4)

b) Solve the following system by using the Crout’s Method.

(4)

$$2x + y + 3z = 13$$

$$x + 5y + z = 14$$

$$3x + y + 4z = 17$$

P.T.O.

- Q5. a) Discuss convergence conditions of Gauss Seidal's Method. (4)
b) Find the root of the equation $xe^x = \cos(x)$ by secant method correct to four decimal places. Take 0 and 1 as initial approximations for the root. (4)

UNIT-III

- Q6. a) Write a nesting function to find factorial of a given number. (4)
b) Write a C program to find length of a string without using library function. (4)
- Q7. a) Write a C program to compute sum of all elements stored in an array using pointer and for loop. (4)
b) Write a C program to find approximate value of $\sin(x)$. (4)

UNIT-IV

- Q8. a) Solve the following system by using the Gauss Jacobi Method. (4)
- $$5x + 2y + z = 12$$
- $$x + 4y + 2z = 15$$
- $$x + 2y + 5z = 20$$
- b) Describe the process of computation and process of compilation of source program in C. (4)
- Q9. a) Prove the order of convergence of Regula Falsi Method. (4)
b) What are the various data types used in C language? Illustrate their declaration and usage. (4)

Sr. No 9430(S)

Roll No. _____

B.SC. (NON-MEDICAL) - 4th SEMESTER EXAMINATIONS, OCTOBER-2017
(SUBJECT-STATISTICAL MECHANICS; PAPER CODE- 09010405)

Time : 03:00 Hours

Maximum Marks – 40

Instruction :

1. Write your Roll No. on the question paper.
2. Candidate should ensure that they have been provided with correct question paper. Complaints in this regard, if any, should be reported to the invigilator on duty in the examination hall within 15 minutes of the commencement of the exams. No complaints shall be entertained thereafter.
3. Attempt five question in all. Question No.01 is compulsory. Attempt at least one question from each unit.
4. Draw diagram whenever required.

Q1. Attempt all the following question:

(4x2=8)

- a) Microcanonical ensemble
- b) Postulates of Quantum statistics
- c) Fluctuation constraints
- d) Division of Phase space in to cells

UNIT-I

Q2 . Assume that each face of a six faced dice is equally likely to land uppermost. Consider a game which involves the tossing of five such dice. Calculate the probability that the number 4 appears uppermost: (i) in exactly one dice, (ii) in exactly two dice, (iii) in exactly five dice, (iv) in none of the five dice, and (v) in atleast one dice.

(8)

Q3 . What are the principles of conservation of density and the conservation of extension in Phase space? Explain how these principles together lead to the postulate of equal a priori probability.

(8)

UNIT-II

Q4 . Deduce Maxwell-Boltzmann law for the distribution of molecules in a gas and hence find the value of constants involved.

(8)

Q5. State and Prove Boltzmann's theorem connecting entropy and probability. Explain how it can be used to calculate the entropy of a monoatomic gas.

(8)

UNIT-III

Q6 . Distinguish between gases obeying Fermi-Dirac and Bose – Einstein statistics. Obtain distribution function for a Fermi gas.

(8)

Q7 . Apply the theory of highly degenerate Fermi gas to the free electron inside a metal and obtain expressions for internal energy and specific heat of the electron gas.

(8)

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Sr. No 9431(S)

Roll No. _____

**B.SC.(NON-MEDICAL)- 4th SEMESTER EXAMINATIONS, OCTOBER-2017
(SUBJECT-INORGANIC CHEMISTRY-IV ; PAPER CODE- 09010408)**

Time : 03:00 Hours

Maximum Marks – 40

Instruction :

1. Write your Roll No. on the question paper.
2. Candidate should ensure that they have been provided with correct question paper. Complaints in this regard, if any, should be reported to the invigilator on duty in the examination hall within 15 minutes of the commencement of the exams. No complaints shall be entertained thereafter.
3. Attempt five question in all. Question No.01 is compulsory. Attempt at least one question from each unit.
4. Draw diagram whenever required.

Q1 . Answer all the following:-

- a) Most of the lanthanide ions are coloured and paramagnetic, explain. What happens when lanthanide oxides are dissolved in hydrochloric acid? (2)
- b) Which element of actinide series has the highest melting and boiling points? (2)
- c) Give chemistry of Cr^{3+} ion test with ammonium hydroxide (2)
- d) Explain why CuCl and AgCl are insoluble in water and NaCl is soluble in water? (2)

UNIT-I

- Q2 .**
- a) Give the different methods for the preparation of lanthanide nitrates and write the formula of hydrated nitrates (3)
 - b) Why is europium II more stable than cerium II? (2)
 - c) Calculate magnetic moment in B.M of Sm^{3+} with outer configuration $4f^6$. (3)

OR

- Q3 .**
- a) Explain the separation of Uranium from Np , Pu and Am. (4)
 - b) Give the difference between lanthanides and actinides. (4)

UNIT-II

- Q4 .**
- a) How is cadmium detected in presence of copper? Describe the chemistry involved in the method (4)
 - b) Describe briefly the theory of precipitation in quantitative analysis. (2)
 - c) Explain about co-precipitation by giving the example. (2)

OR

- Q5 .**
- a) Discuss any one method for the elimination of phosphate radical in group III in qualitative analysis. (4)
 - b) How is nitrate detected in presence of nitrite. (4)

P.T.O.

UNIT-III

- Q6 .** a) Draw the structure of sodium chloride (NaCl) and explain the salient features of the structure. (4)
- b) Discuss the radius ratio rule for predicting the structure of ionic crystals. (4)

OR

- Q7 .** a) Explain the Schottky and Frenkel defects in ionic crystal. (4)
- b) Describe Born- Haber cycle for calculating Lattice Energy of an ionic solid MX. (4)

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Sr. No 9432(S)

Roll No. _____

**B.SC.(NON-MEDICAL)- 4th SEMESTER EXAMINATIONS, OCTOBER-2017
(SUBJECT-PHYSICAL CHEMISTRY-IV; PAPER CODE- 09010409)**

Time : 03:00 Hours

Maximum Marks – 40

Instruction :

1. Write your Roll No. on the question paper.
2. Candidate should ensure that they have been provided with correct question paper. Complaints in this regard, if any, should be reported to the invigilator on duty in the examination hall within 15 minutes of the commencement of the exams. No complaints shall be entertained thereafter.
3. Attempt five question in all. Question No.01 is compulsory. Attempt at least one question from each unit.
4. Draw diagram whenever required.

Q1 . Answer all the following:-

(2*4=8)

- a) Why there was a need for introduction of second law of thermodynamics?
- b) What is the physical significance of Gibb's Free Energy?
- c) What do you know about Miller Indices?
- d) What is a Salt Bridge? Give its Importance.

UNIT-I

- Q2 .**
- a) Derive the expression to show that mixing of gases is always accompanied by increasing in Entropy. (5)
 - b) Calculate the amount of heat supplied to Carnot's Cycle working between 95 °C and 15 °C if the maximum work is obtained is 0.895 kilojoules. (3)
- Q3 .**
- a) State and Explain Nernst Heat Theorm. (4)
 - b) Discuss Gibbs Helmholtz Equation and its importance (4)

UNIT-II

- Q4 .**
- a) Can a solution of 1M copper sulphate be stored in a vessel made of Nickel metal? Given that $E^{\circ}_{Ni/Ni^{2+}} = +0.25$ volt and $E^{\circ}_{Cu/Cu^{2+}} = -0.34$ volt (3)
 - b) Explain the Emf of electrode concentration cell without Transference when cell consisting of gas electrode. (5)
- Q5 .**
- a) Calculate the EMF of Zinc – Silver cell at 30 °C when activity of Zn^{2+} ions is 0.5 and the activity of Ag^+ ion is 10. The standard reduction potentials at 30 °C are Ag^+/Ag electrode = +0.799 volt and Zn^{2+}/Zn electrode = -0.760 volt (2)
 - b) Explain Calomel Electrode (3)
 - c) Explain Liquid junction potential & how it can minimize or eliminated (3)

P.T.O

UNIT-III

Q6 . Explain the following

(2*4=8)

- a) Isotropy and anisotropy
- b) Law of Rational Indices
- c) Elements of Symmetry
- d) Liquid Crystals

Q7. a) A fivefold axes of symmetry cannot present in any crystal. Why?

(2)

b) Both NaCl and KCl have similar structures yet their X-ray Diffraction Pattern is remarkably different, explain.

(3)

c) Derive and Explain the Bragg's Equation.

(3)

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