**ADIKAVI NANNAYA UNIVERSITY**

**II SEMESTER**
**M.Sc.PHYSICS**
**(Effective from 2016-2017 admitted batch)**
**P201 :STATISTICAL MECHANICS.**
**MODEL QUESTION PAPER**

**Time : 3 Hrs.** **Max. Marks:75**

**SECTION - A**

**Answer ALL Questions. 4 x 5 = 60.**

1. a) State and prove the equipartition theorem.
   b) Calculate the specific heat at constant volume of an ideal gas with i degrees of freedom.

   OR

   c) Explain the concept of ensemble. Mention the different types and their properties.
   d) Derive an expression for the most probable distribution of energy among the various systems of a canonical ensemble.

2. a) Distinguish between classical, Bose – Einstein and Fermi Dirac Statistics.
   b) Obtain an expression for Fermi – Dirac distribution law.

   OR

   c)Derive the Planck formula for black body radiation using Bose-Einstein Statistics.
   d) Calculate the pressureof the electromagnetic radiation in a cavity of volume .

3. a) Derive an expression for the specific heat of diatonic gases.
   b) Discuss how the results compare with experiments.

   OR

   c) Discuss in detail the Einstein's theory of specific heat of solids.
   d) Mention the salient features of the theory.

4. Derive the Expression for Lorentz Transformations. 15Marks

   OR

   **b)** Explain Time Dilation as well as length Contract with Mathematical Analysis 10M
   **c)** Briefly write general theory of relativity 5M

**P A R T - B**

**Answer any FIVE Questions 5 x 5 = 25 Marks.**

5. Explain the phenomena of thermionic emission.
6. Explain the Vander walls theory of liquid gas transition.
7. Calculate the average energy per particle of the Fermions at absolute Zero temperature.
8. Show that at low temperatures a diatomic gas behaves like a monoatomic gas.
9. Explain the ortho and para states of hydrogen.
10. State and prove Liouvellie's theorem.
11. Explain Gibbs paradox
12. Explain Relativistic classification of particle

**ADIKAVI NANNAYA UNIVERSITY**

**II SEMESTER**
**M.Sc. PHYSICS**
**(EFFECTIVE FROM 2016-2017 ADMITTED BATCH)**
**P 202 : ELECTRO DYNAMICS**
**Time : 3 Hours MODEL QUESTION PAPER Marks 75**

**Part A**
**Answer all questions 15 x 4 = 60**

1. a) State and prove Gauss Theorem.
   b)Derive Laplace's and Poisson's equations from Gauss law.

OR

b) Explain the method of separation of variables in spherical polar co-ordinates. Obtain potentials inside and outside a dielectric sphere in a uniform electric field.

2. a) State Ampere's circuital law. Define magnetic vector potential and discuss its utility in magnetostatics

OR

b) Write down Maxwell equations in differential and integral forms.Explain their physical significance.

3.a) What re ienard–Wiechart potentials.Calculate the electric and magnetic field using these potentials.

OR

b) What are gauge transformations. Explain Coulomb and Lorentz gauges. Mention their importance.

4. a) Discuss the conditions for the existence of plasma.Discuss the motion of a charged particle in uniform electric and magnetic fields

OR

d) Show that the Maxwell's electromagnetic field equations are invariant under the Lorentz transformation

**PART B**

Answer any FIVE Questions 5 x 5 = 25

5. Cherenkov radiation
6. Radiation damping
7. Displacement current
8. Electromagnetic field tensor
9. Faraday's law of electromagnetic induction
10. Electromagnetic scalar and vector potentials
11. Significance of retarded potentials
12. Maxwell's equations in terms of scalar and vector potentials.

**ADIKAVI NANNAYA UNIVERSITY**

**II SEMESTER**
**M.Sc.PHYSICS**
**(Effective from 2016-2017 admitted batch)**
**P203 : NUMERICAL METHODS AND PROGRAMMING WITH C**
**MODEL QUESTION PAPER**

**Time : 3 Hrs** **Marks :75**

**SECTION - A**

**Answer all Questions** **4 X 15 = 60.**

1.(a). Find the root of the following equation using (i) Bisection Method and (ii) Newton-Raphson method as, correct the result upto 3 decimal places $x^3 - 3x-5=0$.

(OR)

(b) Find f(2) for the data f(0) = 1, f(1) = 3 and f(3) = 55. By using Newton's divided difference formula and Lagrange's formula

2.(a) Solving a system of equations by the Gauss-Seidel method

$$4x_1 + x_2 - x_3 = 3$$
$$2x_1 + 7x_2 + x_3 = 19$$
$$x_1 - 3x_2 + 12x_3 = 31$$

(OR)

(b) 1 From the following table, find the area bounded by the curve and x axis from x=7.47 to x=7.52 using trapezodial, simplson 1/3, simplson 3/8 rule.

| x | 7.47 | 7.48 | 7.49 | 7.50 | 7.51 | 7.52 |
|---|---|---|---|---|---|---|
| f(x) | 1.93 | 1.95 | 1.98 | 2.01 | 2.03 | 2.06 |

(c) Evaluate I = $\int_{-1}^{1} \frac{1}{\quad} dx$ by using simpson's rule with h=0.25 and h=0.5

3. (a) What is keyword? Write any five keywords and explain them.
(b) Distinguish between local and global variables.
(c) Write a program to compute roots of quadratic equation using switch-case statement. (OR)
(d) Write the precedence rules for arithmetic operators and give example.
(f) What are loops? Explain various loop statements with suitable example.

4. a)Explain the following concepts associated with functions: i) Function declaration ii) Function definition iii) Function call.
b) Explain various parameter passing mechanisms.
(OR)
C) What is a Pointer? How is it initialized? What is the function of a pointer variable? What are its uses?
b) Explain the concept of pointers to structures with suitable example.

## PART B

Answer any FIVE Questions 5 x 5 = 25

5.Explain Principle of least squares Techinque

6.Discuss about Gaussian Elimination method for solution of equations

7.write about Increment and Decrement operators in C language with their Syntax

8.Write the various Character Sets in C

9..How to Declaring and initializing string variables in C

10.Briefly write Picard's method of successive approximations

11. Find the root of the following equation using Bisection Method correct the result upto 2 decimal places $x^2$ - 3x-3=0.

12.Draw the flow chart for calculation of Linear regression

**ADIKAVI NANNAYA UNIVERSITY**

**II SEMESTER**
**M.Sc.PHYSICS**
**(Effective from 2016-2017 admitted batch)**
**P204 :NUCLEAR AND PARTICLE PHYSICS**
**MODEL QUESTION PAPER**

**Time : 3 Hrs** **Marks :75**

**SECTION - A**

Answer all Questions **4 X 15 = 60.**

| | | | |
|---|---|---|---|
| 1 | a) | What is meant by Nuclear spin and nuclear magnetic moment? How the magnetic moment is determined experimentally | 5+5 |
| | b) | Discuss one important method used to study the nuclear size | 5 |
| | | OR | |
| | c) | What is a tensor force? Explain how it accounts for the observed quadrapole moment of deuteron | 10 |
| | d) | Briefly explain the characteristics of nuclear forces | 5 |
| 2. | a) | Discuss the formulation of Weizacker's semi – empirical mass formula and obtain the condition for stable isotope | 8+2 |
| | b) | Briefly discuss the collective model of the nucleus. | 5 |
| | | OR | |
| | c) | Give a brief account of Fermi's theory of β – decay. | 10 |
| | d) | Discuss two important selection rules in β – decay. | 5 |
| 3. | a) | What are different types of nuclear reactions | 8 |
| | b) | Describe the Q- equation of a nuclear reaction. What information can you get from the Q- equation | 5+2 |
| | | OR | |
| | c) | Discuss Bohr – Wheeler theory of nuclear fission and derive stability limit against spontaneous fission | 10 |
| | d) | Explain carbon – nitrogen cycle in nuclear fusion | 5 |
| 4. | a) | With the help of a diagram explain the classification of elementary particles | 5 |
| | b) | Explain briefly various interactions among the elementary particles | 10 |
| | | OR | |
| | c) | Discuss the conservation laws that explain the behaviour of elementary particles | 10 |
| | d) | Briefly explain the charge conjugation | 5 |

## PART - B

Answer any Five Questions 5 x 5 = 25

5. Explain the parity and symmetry of the nucleus

6. Briefly explain the nature of information that you can get from scattering experiments

7. Discuss what are Schmidt's limits of the nuclear magnetic moments

8. What are the selection rules in $\gamma$ – decay

9. Discuss briefly about synchrotron

10. Explain the operation of colliding beam accelerators

11. Discuss briefly about Rutherford back scattering experiment

12. Briefly explain the quark model of the nucleus