B.Sc. DEGREE EXAMINATION,APRIL 2020
II Year III Semester
Mathematical Physics and Statistical Mechanics

Time : 3 Hours **Max.marks :60**

Section A $(10 \times 1 = 10)$ Marks

Answer any **TEN** questions

1. Find the eigen values of the matrix $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 1 & 1 \end{bmatrix}$.
2. State cayley - Hamilton theorem.
3. Define Beta function.
4. Show that $\sqrt{\frac{1}{2}} = \pi$.
5. Write the Laguerre Differential equation.
6. Write the most general solution of Bessel's differential equation.
7. Define phase space.
8. What are micro states?
9. Define micro canonical ensemble.
10. What are Bosons?
11. Give the postulates of Quantum Statistics.
12. Write the most proble distribution of Fermi Dirac statistics.

Section B $(5 \times 4 = 20)$ Marks

Answer any **FIVE** questions

13. Find the Characteristic equation of the given matrix and verify cayley Hamilton theorem $\begin{bmatrix} 1 & 2 & 3 \\ 2 & -1 & 4 \\ 1 & 1 & 1 \end{bmatrix}$.
14. Evaluate Gamma Function.
15. Show that $\int_0^\infty \frac{x^8(1-x^6)}{(1+x)^2 4} dx = 0$.
16. Obtain the solution of Laguerre's differential equation.
17. Explain the postulates of statistical Mechanics.
18. Describe canonical ensemble and Grand canonical ensemble.
19. Give the comparison between MB,FO and BE statics.

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. a)Explain the procedure for Diagonalization of Matrices (5 marks)
    b) Diagolise the matrix A $= \begin{bmatrix} 1 & 2 & 3 \\ 2 & -1 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.
21. a)Show that $\beta(m,n) = \dfrac{\sqrt{m}\sqrt{n}}{\sqrt{m+n}}$ b)Evaluate $\int_0^\infty e^{-x^2} dx$
22. Obtain the series solution of Hermite Differential Equation.
23. Derive the Marwell - Boltzman distribution law.
24. Derive Fermi- Dirac distribution function.

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