

SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR
WOMEN(AUTONOMOUS)

(Affiliated to the University of Madras and Re-accredited with A+ Grade by NAAC)
Chromepet, Chennai—600044.

B.Sc. END SEMESTER EXAMINATION APRIL/NOV - 2021

SEMESTER- III

20UPHCT3005 – Mathematical Physics & Statistical Mechanics

Total Duration : 3 Hrs

MCQ : 30 Mins

Descriptive : 2 Hrs.30 Mins

Total Marks : 75

MCQ : 15

Descriptive : 60

Section B

Answer any **SIX** questions ($6 \times 5 = 30$ Marks)

- Find the characteristic equation of the matrix $A = \begin{pmatrix} 1 & 2 & 3 \\ 2 & -1 & 4 \\ 3 & 1 & 1 \end{pmatrix}$ and verify the Cayley - Hamilton theorem for it.
- Show that $2^n \Gamma(n+1/2) = 1.3.5 \dots (2n-1) \sqrt{\pi}$
- Derive Hermite's differential equation.
- Explain about the different types of Ensembles.
- Discuss the postulates of Quantum statistics.
- Derive a relation between Beta and gamma function.
- Define Phase Space and Distinguish between Micro and Macro states.
- Give the comparison of three statistics.

Section C

Answer any **THREE** questions ($3 \times 10 = 30$ Marks)

- Diagonalise the following matrix

$$\begin{pmatrix} 1 & -3 & 3 \\ 3 & -5 & 3 \\ 6 & -6 & 4 \end{pmatrix}$$

Contd...

10. Derive the series solution for Bessel's differential equation in detail.
11. Derive Maxwell-Boltzmann distribution law.
12. Derive Bose-Einstein distribution law.
13. Derive an expression for the evaluation of beta and gamma function.