

**M. SC. (APPLIED STATISTICS)
(MSCAST)**

**Term-End Examination
June, 2026**

**MST-011 : REAL ANALYSIS, CALCULUS
AND GEOMETRY**

Time : 2 Hours

Maximum Marks : 25

Note : (i) *Question No. 1 is compulsory.*

(ii) *Attempt any **two** questions from the
remaining Question Nos. 2 to 4.*

(iii) *Non-programmable scientific
calculator is allowed.*

(iv) *Symbols have their usual meanings.*

1. (a) Explain identification of one-one function using horizontal line test. 2
- (b) Write the vector equation of a plane which passes through the point $A(1, 2, 3)$ and perpendicular to the line BC , where $B(2, 4, 1)$ and $C(7, 2, 10)$. 1
- (c) Define beta and gamma functions. 2

[2]

2. (a) Evaluate the integral $\int_0^3 \int_{y/2}^1 e^{x^2} dx dy$.

(b) Prove that the function $f: \mathbf{R} \rightarrow \mathbf{R}$ defined by :

$$f(x) = 3x + 4, x \in \mathbf{R}$$

is both convex and concave. 5+5

3. State and prove relation between beta and gamma functions. 10

4. (a) Test the convergence of the series :

$$\sum_{n=1}^{\infty} \left(\frac{n}{n+2} \right)^{n^2}.$$

(b) Define each of the following and also give *one* example of each : 5+5

(i) Minkowski distance

(ii) Manhattan distance

(iii) Euclidean distance

(iv) Chebyshev distance

(v) Hamming distance

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