

**First Year B.Sc (MRT) Degree Supplementary Examinations
September 2025
Mathematics**

Time: 3 Hours

Total Marks: 100

- Answer all questions to the point neatly and legibly • Do not leave any blank pages between answers • Indicate the question number correctly for the answer in the margin space
- Answer all parts of a single question together • Leave sufficient space between answers
- Draw table/diagrams/flow charts wherever necessary.
- The use of a simple calculator is allowed, but using scientific calculator or sharing any calculator is strictly prohibited under any circumstance.

Essay

(2x20=40)

1. (a) Calculate the mean of the following data.

Class	1-10	11-20	21-30	31-40	41- 50	51-60
f	13	25	27	15	12	8

(b) Using Trapezoidal rule evaluate $\int_0^2 \frac{1}{1+x} dx$.

2. (a) integrate the following

(i) $\int 3x^2(x^3 + 4)^7 dx$ (ii) $\int \frac{1}{(4x+3)} dx$

(b) Find Div \vec{F} , where $\vec{F} = xz \hat{i} + y^3z \hat{j} + z^4 \hat{k}$ at(1,1,2)

Short notes:

(8x5=40)

3. Differentiate $e^{x^2} \sin x$ with respect to x .
4. If two sides of a triangle are 8 units and 6 units and the included angle is 30° . Then find the area of the triangle.
5. Using Cramer's rule solve:

$$\begin{aligned} x - 2y + 2z &= 3 \\ 2x + 4y - z &= 1 \\ 2x - 5y + 2z &= 4 \end{aligned}$$

6. Find the Laplace transform of $e^{-4t} \sin 3t$.

7. Find the values of $(i)^{1/3}$.

8. Calculate the following values.

(i) $\sin^2 20 + \cos^2 20$

(ii) $\cos^2 15 - \sin^2 15$

9. Find the coefficient of correlation between x and y .

x	1	2	3	4	5
y	12	11	13	16	8

10. Find the sum of the series $10+14+18+ \dots$, upto 100 terms..

Answer briefly:

(10x2=20)

11. Evaluate the determinant $\begin{vmatrix} 1 & 2 & 0 \\ 3 & 1 & 4 \\ 2 & 4 & 1 \end{vmatrix}$

12. Find the value of 7P_2

13. Find grad (xyz)

14. If $x = 3t^2$; $y = 2t + 5$. Find $\frac{dy}{dx}$

15. Evaluate $\lim_{x \rightarrow 1} \frac{x+3}{x^2+1}$

16. Find the modulus of the complex number $\frac{3+i}{4-i}$

17. Find $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$, if $f = x^3 + 4y$

18. Define Fourier Series of a function $f(x)$.

19. If $\vec{r} = t^3 \hat{i} + 3t \hat{j} + t^4 \hat{k}$, find $\frac{d\vec{r}}{dt}$.

20. Find the median of the following set of observations:

34, 4, 13, 32, 24, 23, 34, 14, 23, 25, 28, 29.
