

**First Year B.Sc (MRT) Degree Supplementary Examinations
March 2019**

Mathematics

Time: 3 Hours

Total Marks: 100

- Answer all Questions.
- Draw Diagrams wherever necessary.

Essay**(2x20=40)**

1. Find the product AB where $A = \begin{bmatrix} 2 & 7 \\ 1 & 2 \\ 3 & 1 \end{bmatrix}$ $B = \begin{bmatrix} 2 & 3 & 6 \\ 9 & 2 & 5 \end{bmatrix}$

Find the area of the triangle whose vertices are (1,-1), (-4, 6) and (-3,-5).

Find $\frac{dy}{dx}$ if $y = \frac{\cos x}{x^2}$.

2. Find $\bar{a}X(\bar{b}X\bar{c})$ where $\bar{a} = i - 2j - 3k$, $\bar{b} = 2i + j - k$, $\bar{c} = i + 3j - k = i -$

Calculate the correlation coefficient for the following data:

x	2	4	5	6	8	11
y	18	12	10	8	7	5

Find Laplace transform of $\sin 2t \cos 3t$.**Short notes:****(8x5=40)**

3. A coin is tossed 5 times. What is the probability of obtaining exactly 3 heads.

4. Solve $\frac{dy}{dx} = e^{2x+3y}$.

5. If $\bar{a} = 4 - 5i$ and $\bar{b} = 2 + 3i$ find $\bar{a} \bar{b}$ and $\bar{a}/\bar{b}$.

6. Find the divergence and curl of the vector $\bar{V} = (x^2 + yz)i + (y^2 + zx)j + (z^2 + xy)k$

7. Find $\int \sin^3 x \cos x dx$.

8. Evaluate $\frac{\tan 65^\circ}{\cot 25^\circ}$

9. Find the value of determinant $\begin{vmatrix} 1 & 2 & 3 \\ 4 & 2 & 5 \\ 3 & 2 & 1 \end{vmatrix}$.

10. If $\log 3 = 0.4771$, find the number of digits in 3^{43} .

Answer briefly:

(10x2=20)

11. Find the simplest value of $64 \times (8)^{-4/3}$.
12. State the relation between the sides and angles of a triangle.
13. Find $\lim_{x \rightarrow -3} \frac{x^3 - 27}{x + 3}$.
14. Find the scalar triple product of the vectors $\vec{a} = 2\hat{i} - \hat{j} + \hat{k}$, $\vec{b} = \hat{i} + 2\hat{j} - 3\hat{k}$, $\vec{c} = 3\hat{i} - 4\hat{j} + 5\hat{k}$.
15. Find the real part of $\frac{1}{1+i}$.
16. A bag contains 3 red and 2 blue marbles. A marble is drawn at random. What is the probability of drawing a blue marble.
17. Find Fourier transform of $f(x) = \begin{cases} 1 & |x| < 1 \\ 0 & \text{otherwise} \end{cases}$.
18. Write the probability density function of normal distribution.
19. Find $\int x e^x dx$.
20. Find the median of the following data:
20, 25, 17, 18, 8, 15, 22, 11, 9, 14.
