

QP CODE: 105018

Reg. No:

**First Year B.Sc (MRT) Degree Regular/Supplementary Examinations
March 2022**

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

Essay

(2x20=40)

1. If 3% of electric bulbs produced by a company are defective find the probability that in a sample of 100 bulbs atmost 3 are defective.

Calculate the median for the following data

Class	0-5	5-10	10-15	15-20	20-25
Frequency	5	10	15	12	8

2. $\int_0^6 \frac{dx}{1+x^2}$ by using trapezoidal rule.

If $\sin 3A = \cos(A - 26)$ where $3A$ is an acute angle, find the value of A .

Short notes:

(8x5=40)

3. Find the value of the determinant $\begin{vmatrix} 2 & 5 & 4 \\ 1 & 4 & 3 \\ 6 & 8 & 10 \end{vmatrix}$.

4. Find the coefficient of x^{11} in the expansion of $(1 - 2x + 3x^2)(1 + x)^{11}$.

5. Find the Laplace transform of $\sin 2t \sin 3t$ • $e^{2t} \cos^2 t$.

6. The probability that a pen manufactured by a company will be defective is $\frac{1}{10}$. If

12 such pens are manufactured find the probability that

- Exactly two will be defective.
- At least two will be defective.

7. From the given data find Karl-Pearson's coefficient of correlation

$\sum x=9, \sum y=50, \sum xy=819, \sum x^2=260, \sum y^2=2672, n=9$.

8. Differentiate the following with respect to x . (i) $\frac{5}{1-3x}$ (ii) $\frac{2x^2+3}{\sqrt{x}}$.

9. If $\bar{a} = \bar{i} - 2\bar{j} - 3\bar{k}$ $\bar{b} = 2\bar{i} + \bar{j} - \bar{k}$ $\bar{c} = \bar{i} + 3\bar{j} - \bar{k}$, find $\bar{a} \times (\bar{b} \times \bar{c})$ and $\bar{a} \cdot (\bar{b} \times \bar{c})$.

10. Find the cube root of unity

P.T.O

Answer briefly:

(10x2=20)

11. Solve $\frac{dy}{dx} = e^{x+y}$.

12. Find the mean of 12, 18, 14, 15, 16.

13. Find the simplest form of $243 \times (27)^{-4/3}$.

14. Write down the logarithmic series.

15. Find the divergence and curl of $\vec{f} = x^2yz\vec{i} + xy^2z\vec{k} + xyz^2\vec{k}$.

16. Find AB when $A = \begin{pmatrix} 1 & -1 \\ 3 & 0 \end{pmatrix}$ and $B = \begin{pmatrix} 3 & 1 \\ 1 & 4 \end{pmatrix}$.

17. Find $\lim_{x \rightarrow 0} \frac{x^4 - 1}{x - 2}$.

18. How many different numbers of 4 digits can be formed with the digits 2, 3, 4, 5, 6, 7 none of the digits repeated in any of the numbers so formed.

19. In a triangle ABC if $a=15$, $b=36$, $c=39$ find $\sin \frac{B}{2}$.

20. Find AT if $A = \begin{bmatrix} 3 & 4 & 5 \\ 1 & 2 & 4 \\ 2 & 5 & 7 \end{bmatrix}$.
