QP CODE: 105018 **Reg. No: ……..**

First Year B.Sc (MRT) Degree Supplementary Examinations March 2020

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. In 800 families with 5 children each, how many would you expect to have: 3 boys; 4 girls; at most 2 girls. Assume equal probabilities for boys and girls.

   Calculate the median for the following data:

Class:	0-5	5-10	10-15	15-20	20-25
f :	5	10	15	12	8

2. Find Laplace transform of $sin2tcos3t$

   Simplify $\frac{(cos5\theta - isin5\theta)^2(cos7\theta + isin7\theta)^{-3}}{(cos4\theta - isin4\theta)^9(cos\theta + isin\theta)^5}$

Short notes: **(8x5=40)**

3. How many different numbers of 4 digits can be formed with 2, 3, 4, 5, 6, 7 none of the digits being repeated in any of the numbers formed
4. Find the value of the determinant $\begin{vmatrix} 2 & 5 & 4 \\ 1 & 4 & 3 \\ 6 & 8 & 10 \end{vmatrix}$
5. In any triangle ABC, prove that $\frac{a-b}{a+b} = \tan\left(\frac{A-B}{2}\right)\tan\left(\frac{C}{2}\right)$.
6. If $sinA = \frac{-5}{13}$, $cosB = \frac{4}{5}$ where $\pi < A < \frac{3\pi}{2}$ and $\frac{3\pi}{2} < B < 2\pi$, find the value of cos(A+B).
7. Find $\lim_{x\to 2} \frac{x^2-4}{x-2}$.
8. Find the derivative of $\frac{x^2+1}{x^2-1}$.
9. Find $[\bar{a}\,\bar{b}\,\bar{c}]$ if $\bar{a}$=2i-3j+4k, $\bar{b}$=i+2j-k, $\bar{c}$=3i-j+2k.
10. Find the probability of getting 3 white balls in a draw of 3 balls from a box containing 5 white and 4 black balls.

P.T.O

Answer briefly: **(10x2=20)**

11. Find $\int (4e^{3x} + 1)\, dx$.
12. Find the 12th term of the series 1, 2 ,4, 8, 16,……..
13. Determine the mean of *305, 320, 332, 350.*
14. Find the simplest value of $8 \times (4)^{-3/2}$.
15. Express $(-1 - i)$ in the form $r(cos\theta + isin\theta)$.
16. Prove that curl $\bar{r}$ =0 where $\bar{r}$ = *xi+yj+zk.*
17. Find $\frac{\partial u}{\partial x}$ where $u = log(x^2 + y^2)$.
18. If A= $\begin{pmatrix} 0 & 2 & 3 \\ 2 & 1 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} 7 & 6 & 3 \\ 1 & 4 & 5 \end{pmatrix}$ find the value of 2A+3B.
19. In how many ways can 6 persons be seated on a round table.
20. Find the Laplace transform of $e^{-2t} sin4t$.

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