SUBJECT CODE: 19MT/MC/AT13

B. Sc. DEGREE EXAMINATION, NOVEMBER 2020
BRANCH I - MATHEMATICS
FIRST SEMESTER

COURSE   : MAJOR CORE
PAPER   : ALGEBRA AND TRIGONOMETRY
TIME   : 90 MINUTES   MAX. MARKS: 50

SECTION – A

Answer **ALL** questions   (**3 × 2 = 6**)

1. Form the cubic equation whose roots are $1, 3 - \sqrt{-2}$.

2. Find the eigen values of the matrix $\begin{bmatrix} 8 & -4 \\ 2 & 2 \end{bmatrix}$.

3. Prove that $\tanh^{-1} x = \dfrac{1}{2} \log_e \left(\dfrac{1+x}{1-x} \right)$.

SECTION-B

Answer any **THREE** questions   (**3 × 8 = 24**)

4. Diminish the roots of $x^4 - 5x^3 + 7x^2 - 4x + 5 = 0$ by 2.

5. Show that the sum of the series $1 + \dfrac{1+2}{2!} + \dfrac{1+2+2^2}{3!} + \dfrac{1+2+2^2+2^3}{4!} + ... = e(e-1)$.

6. Prove that $\sin^8 \theta = \dfrac{1}{2^7} \left[\cos 8\theta - 8\cos 6\theta + 28\cos 4\theta - 56\cos 2\theta + 35 \right]$.

7. Find the general value of $Log_2(-3)$.

SECTION-C

Answer any **ONE** question   (**1 × 20 = 20**)

8. Diagonalise the matrix: $\begin{bmatrix} 2 & -2 & 3 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$.

9. a) Find the sum of the series $\sum_1^\infty \dfrac{(-1)^{n+1} x^n}{n(n+1)(n+2)}$.

   b) Prove that the equation $\dfrac{ah}{\cos\theta} - \dfrac{bk}{\sin\theta} = a^2 - b^2$ has four roots and that the sum of the

   four values of θ which satisfy it is equal to an odd multiple of π radians. (**10+10**)

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