**2021**
**B.A./B.Sc.**
**Third Semester**
CORE – 7
**STATISTICS**
*Course Code: STC 3.31*
(Mathematical Analysis)

**PART–B**
Total Mark: 30

*Answer the following questions.*

1.  (a)  If $f(x+y) = f(x) + f(y) : x, y \in R$; $f(x) = x^2 g(x)$; $g(x)$ is continuous, then find $f'(x)$.    3
    (b)  What is the relation between $f(a)$ and $f(b)$ according to Rolle's theorem?    3

2.  Find the Taylor's series expansion of $3\sin x + 2\cos x$.    6

3.  (a)  Test the convergence of the series $\dfrac{2x}{1^3} + \dfrac{3x^2}{2^3} + \dfrac{4x^3}{3^3} + \ldots + \dfrac{(n+1)x^n}{n^3} + \ldots$    3
    (b)  State and prove Raabe's test.    3

4.  (a)  Evaluate: $\Delta^3 (1-x)(1-2x)(1-3x)$, the interval of difference being unity.    2
    (b)  State and prove Newton-Gauss forward formula.    4

5.  (a)  Using the general quadratic formula, derive Simpson's $\left(\dfrac{3}{8}\right)^{th}$ rule formula for numerical integration.    4
    (b)  Obtain the approximate quadrature formula: $\displaystyle\int_{-1}^{1} U_x \, dx = \dfrac{1}{12}\left[(U_1 + U_{-1}) - (U_3 + U_{-3})\right]$    2

———————————