SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai — 600 044.
B.Sc.(Statistics) END SEMESTER EXAMINATIONS NOVEMBER -2023
SEMESTER - I
20USTAT1001 - Allied Mathematics - I

Total Duration : 2 Hrs 30 Mins. Total Marks : 60

Section B

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. Show that $\frac{1}{1!} + \frac{1+2}{2!} + \frac{1+2+3}{3!} + ... = \frac{3e}{2}$
2. Show that $\frac{1}{1.2} + \frac{1}{3.4} + \frac{1}{5.6} + ... = log2$.
3. Find the nth derivative of e^{ax} with respect to x.
4. Find the nth derivative of $y = \frac{1}{x^2+5x+6}$.
5. If $x = rcos\theta$, $y = rsin\theta$, then find $\frac{\partial(x,y)}{\partial(r,\theta)}$.
6. Show that $2^6 cos^7\theta = cos7\theta + 7cos5\theta + 21cos3\theta + 35cos\theta$.
7. If $\frac{\sin\theta}{\theta} = \frac{2165}{2166}$. show that θ is equal to 3° 1' nearly.
8. Evaluate $\int_0^{\pi/2} \cos^9 x dx$.

Section C

Answer any **THREE** questions $(3 \times 10 = 30$ Marks)

9. Show that $\sqrt{8} = 1 + \frac{3}{4} + \frac{3.5}{2.4^2} + \frac{3.5.7}{2.3.4^3} + ...$
10. If $y = \sin^{-1} x$, prove that
    i) (1- x^2)y_2 - $xy_1 = 0$.
    ii) (1- x^2)y_{n+2} - (2n + 1)xy_{n+1} - $n^2 y_n = 0$.
11. Find maximum and minimum values of the function $f = x^2y^2$ - x^2 - y^2.
12. Express $\frac{sin5\theta}{sin\theta}$ as a polynomial in $\cos\theta$.
13. Obtain the reduction formula for $\int sin^n x \, dx$.

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