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 APRIL-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. Solve: $1 + \frac{3}{4} + \frac{3.5}{4.8} + \frac{3.5.7}{4.8.12} + ...$
2. Show that $\frac{e^2+1}{e^2+1} = \frac{\frac{1}{1!} + \frac{1}{3!} + \frac{1}{5!} + ...}{1 + \frac{1}{2!} + \frac{1}{4!} + ...}$
3. If y $= \frac{3}{(x+1)(2x-1)}$, Apply nth derivative to find y_n,
4. If $x + y + z = u$, $y + z = v$ and $z = uvw$, show that $\frac{\partial(x,y,z)}{\partial(u,v,w)} = uv$
5. Show that $\frac{sin6\theta}{sin\theta}$ = 32 $\cos^5\theta$ - 32 $\cos^3\theta$+ 6 $\cos\theta$
6. Apply cosnθ formula to express cos6θ in terms of cosθ.
7. Show that U_n + n(n-1) U_{n-2} = n$(\frac{\pi}{2})^n$ if $U_n = \int_0^{\pi/2} x^n sinx dx$ and n is a positive integer.
8. Examine for maximum or minimum value of $x^2 + y^2$ - 4x-2y+10

Section C

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

9. Solve the series: $\frac{1}{2.3} + \frac{1}{4.5} + \frac{1}{6.7} + ...$
10. If y = a cos (log x) + b sin (log x), Apply nth derivative to prove that $x^2 y_{n+2}$ + (2n+1)xy_{n+1} (n^2+1)y_n = 0
11. Examine the maximum and minimum of the function 2($x^2 - y^2$) - $x^4 + y^4$
12. Compute $\sin^8\theta$ and prove that
    $\sin^8\theta = \frac{1}{2^7}$ [cos8θ - 8 cos6θ + 28cos4θ - 56cos2θ + 35]
13. Obtain the reduction formula for $\int sin^n x dx$

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