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. END SEMESTER EXAMINATIONS NOVEMBER-2022
SEMESTER - I
20USTAT1001 - Allied Mathematics - I

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

Section A

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

1. Find the coefficient of x^n in e^{e^x}
2. Find the nth derivative of sin$(ax + b)$
3. If x = u(1-v) y = uv(1-w), z = uvw. Find $\frac{\partial(x, y, z)}{\partial(u, v, w)}$
4. Express $\cos 6\theta$ as a polynomial in
   (1) $\cos\theta$ and
   (2) $\sin\theta$
5. Find the reduction formula for $\int e^{ax}x^n dx$
6. Find the nth derivative of $\log$ (ax + b)
7. Find the maxima and minima of the function $2x^3$ - $3x^2$ - $36x$ + 10
8. Evaluate $\int_0^{\frac{\pi}{2}} \sin^6 x \cos^4 x dx$

Section B

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

9. Show that $1 + \frac{1+3}{2!} + \frac{1+3+3^2}{3!} + \frac{1+3+3^2+3^3}{4!} + ... = \frac{e(e^2-1)}{2}$
10. If y = sin(m $\sin^{-1}$x) show that (1 - x^2)y_{n+2}- (2n+1)xy_{n+1}+(m^2-n^2)y_n = 0
11. Show that the maximum value of $x^2y^2z^2$ subject to the $x^2 + y^2 + z^2 = a^2$ is $\frac{a^2}{3}^3$
12. Express $\frac{\sin 7\theta}{\sin\theta}$ as a polynomial in $\cos\theta$ and $\sin\theta$
13. If $I_n = \int_0^{\frac{\pi}{2}} \sin^n x dx$ prove that $I_n = \frac{n-1}{n} I_{n-2}$ hence evaluate $\int_0^{\frac{\pi}{2}} \sin^7 x dx$

*****