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.(AI) - END SEMESTER EXAMINATIONS APRIL-2023
SEMESTER - II
22UAIAT2002 - Allied Mathematics - II

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

Section B

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

1. Derive Reduction formula for $\int sin^n x dx$ and also discuss it's particular case.
2. Solve using Bernoulli's generalized integration by parts:
   1) $\int x^3$ sinxdx
   2) $\int x^4$ cosxdx
3. Solve $(D^2 + 3D + 2)y = e^{-2x} +$ sin x
4. Solve PDE i) $p^2 + q^2 =$ npq
   ii) pq + p + q = 0
5. Find the Laplace Transform of
   i) 4 sin 3t
   ii) sin (2t+3)
   iii) 2at
6. Find the angle between the surfaces $x^2 + y^2 + z^2 = 9$, $z = x^2 + y^2$ - 3 at the point (2,-1, 2).
7. Show that $\nabla^2 \log r = 1/r^2$
8. If $\bar{F} = 3xy\bar{i}$ - $y^3\bar{j}$, Compute $\int \bar{F}.\bar{dr}$ along $y = 2x^2$ from (0,0) to (1,2)

Section C

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

9. Derive Reduction formula for $\int sin^m\ x\ cos^n\ x\ dx$ and also discuss it's Particular case.
10. Solve $p = (1 + q^2)y^2$
11. Using Laplace Transform, Solve $\frac{d^2y}{dt^2} + 6\frac{dy}{dt} + 5y = e^{-2t}$

Contd...

12. i) Find the unit vector normal to the surface $x^2 + y^2 + 2z^2 = 4$ at the point (1,1,1).
    ii) Prove that $(2x + yz)\bar{i} + (4y + xz)\bar{j}$ - $(6z\text{-}xy)\bar{k}$ is solenoidal as well as irrotational.

13. Verify Gauss divergence theorem for $(x^3 - yz)\bar{i} - 2x^2y\bar{j} + 2\bar{k}$ over the cube bounded by $x = y = z = 0$ to $x = y = z = a$.

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