B.Sc. DEGREE EXAMINATION,APRIL 2019
I Year II Semester
ALLIED MATHEMATICS -II

Time : 3 Hours **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. Form the partial differential equation by eliminating a, b from $z = ax + by + a\ ^2 + b^2$.
2. Form the partial differential equation by eliminating the arbitrary function from $z = f(x^2 - y^2)$.
3. Find the value of $L[1]$.
4. $L[sinat] =$ ________.
5. Find $L^{-1}\left[\dfrac{s}{s^2 - a^2}\right]$.
6. Find $L^{-1}\left[\dfrac{1}{s^{n+1}}\right]$.
7. Find $\nabla\phi$ at (1,1,1) if $\phi(x, y, z) = x^2y + y^2x + z^2$.
8. If $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$ find $\nabla\vec{r}$.
9. Give the Fourier expansion of f(x) in [0,2π].
10. Find a_0 if $f(x) = x$ in [0,2π].
11. Find the unit vector normal to the surface $x^2 + 3y^2 + 2z^2 = 6$ at the point (2, 0, 1).
12. Find $\nabla \times \vec{F}$ if $\vec{F} = xz^3\vec{i} - 2xyz\vec{j} + xz\vec{k}$.

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

13. Solve $p + q = pq$.
14. Derive the Laplace transform of e^{at}.
15. Find the Laplace inverse of $\dfrac{10}{(s + 2)^6}$.
16. Show that the area bounded by the closed curve C is given by $\dfrac{1}{2}\oint_C (xdy - ydx)$.

17. Find a_n in the fourier expansion of $f(x) = \dfrac{\pi - x}{2}, 0 < x < 2\pi$.
18. Find the value of a so that the vector $\vec{F} = (z+3y)\vec{i} + (x-2z)\vec{j} + (x+az)\vec{k}$ is solenoidal.
19. Find $\displaystyle\int_2^3 \vec{f}(t)dt$ if $\vec{f}(t) = (3t^2-1)\vec{i} + (2-6t)\vec{j} - 4t\vec{k}$.

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. Solve the equation $x(y^2-z^2)p + y(x^2-z^2)q = z(y^2-x^2)$
21. Find $L\left[t\sin^2 t\right]$.
22. Find $L^{-1}\left[\dfrac{s^2}{(s^2+4)(s^2+9)}\right]$.
23. Find $\displaystyle\int_C \vec{F}\cdot\vec{dr}$ where $\vec{F} = (x^2-y^2)\vec{i} + 2xy\vec{j}$ and C is the square bounded by the coordinate axis and the lines x = a and y = a.
24. Find the Fourier expansion of the function $f(x) = \left(\dfrac{\pi - x}{2}\right)^2, 0 < x < 2\pi$.

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