B.Sc. DEGREE EXAMINATION,NOVEMBER 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 a partial differential equation by eliminating the arbitrary constants from $z = (x^2 + a)(y^2 + b)$
2. Write down the auxiliary equation of$Pp + Qq = R$.
3. Prove that$L(1) = \frac{1}{s}$.
4. Find $L\left[t^2 e^{-at}\right]$.
5. Find $L^{-1}\left[\frac{1}{(s+3)^3}\right]$.
6. Show that $L^{-1}\left[\frac{s+1}{s^2+2s+2}\right] = e^{-t}\cos t$.
7. If $\phi = x + xy^2 + yz^3$ find $\nabla\phi$ at $(1, 0, 0)$.
8. State Green's Theorem.
9. Define Fourier series.
10. Find the constant a_0 of the Fourier Series for the function $f(x) = x$ in $0 \leq x \leq 2\pi$.
11. Solve $p + q = x + y$.
12. Show that the vector $\vec{F} = 3x^2y\hat{i} - 4xy^2\hat{j} + 2xyz\hat{k}$ is solenoidal.

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

Answer any **FIVE** questions

13. Solve $Z = p^2 + q^2$.
14. Evaluate$L\left[t^2 \cos 2t\right]$.
15. Find$L^{-1}\left[\frac{1}{s(s+1)(s+2)}\right]$.
16. If $\vec{F} = x^2y^2\,\vec{i} + y\,\vec{j}$ and C is a curve $y^2 = 4x$joining the points$(0, 0)$to $(4, 4)$, then find $\int_C \vec{F}.\,d\,\vec{r}$.

17. Find the Fourier series for the function $f(x) = x - \pi$ in the interval $(-\pi, \pi)$.
18. Find the value of $'a'$ if $\vec{F} = (axy - z^2)\vec{i} + (x^2 + 2yz)\vec{j} + (y^2 - axz)\vec{k}$ is irrotational.
19. Solve $yzp + zxq = xy$.

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

Answer any **THREE** questions

20. Solve $x(z^2 - y^2)p + y(x^2 - z^2)q = z(y^2 - x^2)$.
21. Find $L\left[\dfrac{\cos 3t - \cos 2t}{t}\right]$.
22. Find $L^{-1}\left[\dfrac{s^2 + 9s + 2}{(s-1)^2(s+3)}\right]$.
23. Find the directional derivative of $\phi(x, y, z) = x^3 + y^3 + z^3$ at the point $(1, -1, 2)$ in the direction of $\hat{i} + 2\hat{j} + \hat{k}$.
24. Express $f(x) = (\pi - x)^2$ as a Fourier series of period 2π in the interval $0 < x < 2\pi$. Hence deduce the sum of the series $1 + \dfrac{1}{2^2} + \dfrac{1}{3^2} + \dfrac{1}{4^2} + \cdots$.

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