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. State Dirichlet's conditions.
2. Find a_0 for the Fourier series of the function $f(x) = x^3$ in $-\pi < x < \pi$.
3. Form the Partial differential equation by eliminating the arbitrary constants a and b from the equation $z = (x - a)(y - b)$.
4. Solve : $p + q = x + y$.
5. Find $L[e^{-t}\left(t^2 + 1\right)]$
6. Find $L[\sin at\ ]$
7. Find $L^{-1}[\ \frac{1}{(s-2)^4}\ ]$.
8. Find the inverse laplace transform of $\frac{1}{(s+4)^2+9}$
9. If $\overrightarrow{r} = x\overrightarrow{i} + y\overrightarrow{j} + z\overrightarrow{k}$ then prove that curl $\overrightarrow{r} = 0$.
10. Show that the vector $3x^2y\ \ \overrightarrow{i} - 4xy^2\overrightarrow{j} + 2xyz\overrightarrow{k}$ is solenoidal.
11. State Green's theorem.
12. Solve :$px^2 + qy^2 = z^2$.

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

Answer any **FIVE** questions

13. Find the Fourier series for the function $(x) = |x|\ \ , -\pi < x < \pi$.
14. Form the Partial differential equation by eliminating the arbitrary function from $z = xf(x + y) + g(x + y)$.
15. State and prove change of scale property.
16. Find $L^{-1}\ [\ \frac{s+2}{(s^2+1)(s-4)}\ ]$.
17. Find the directional derivative of the function $xyz - xy^2z^3$ at the point $(1, 2, -1)$ in the direction of the vector $\overrightarrow{i} - \overrightarrow{j} - 3\overrightarrow{k}$.
18. Find ϕ if $\nabla\phi = (y + sinz)\ \overrightarrow{i} + x\overrightarrow{j} + xcosz\overrightarrow{k}$
19. Find the complete solution of $8z = p^3 + q^3$.

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

Answer any **THREE** questions

20. Obtain a Fourier series for the function $f(x) = x + x^2$, $-\pi < x < \pi$
21. Solve :$x\left(z^2 - y^2\right)p + y\left(x^2 - z^2\right)q = z(y^2 - x^2)$.
22. (i) Find $L[\ \frac{e^{-at} - e^{-bt}}{t}\ ]$

    (ii) Find $L\ [t^2\ cost\ ]$.
23. Find $L^{-1}\ [\ \frac{7s-1}{(s+1)(s+2)(s+3)}\ ]$.
24. Verify Green's theorem for $\int_C \left(3x^2 - 8y^2\right) dx + (4y - 6xy)dy$ where C is the boundary of the region defined by $x^2 = y$ and $x = y^2$.

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