**B.Sc.DEGREE EXAMINATION,APRIL 2020**
**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 arbitrary constants a and b from
$log(az-1) = x + ay + b$.
2. Find the complete solution of $\sqrt{p} + \sqrt{q} = 1$.
3. Find Laplace transform of $[sin^2 t]$.
4. Find Laplace transform of $[t^3 - t - 1]$.
5. Find Inverse Laplace transform of $^{-1}[\frac{1}{s^2-25}]$.
6. Find Inverse Laplace transform of $[\frac{s-1}{(s-1)^2+2}]$.
7. Show that $curl(grad\phi) = 0$.
8. If $\vec{F} = x^2\vec{i} + y^2\vec{j}$, evaluate $\int \vec{F}.\vec{dr}$ along the line $y = x$ from (0,0) to (1,1).
9. Write the Euler's formula for Fourier coefficients in $(0, 2\pi)$.
10. Determine the Fourier constant $a_0$ for the function $f(x) = x^2$ of period $2\pi \ in \ 0 \leq x \ \leq 2\pi$.
11. Find Laplace transform of$[t^2 e^{-3t}]$.
12. If $\phi = xyz, findgroup\phi$ at (1,1,1).

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

Answer any **FIVE** questions

13. Form the partial differential equation by eliminating arbitrary functions $f$ and $g$ from
$z = f(ax + by) + g(\alpha x + \beta y)$.
14. Find $L[t^2 cos2t]$.
15. Find inverse Laplace transform of $\dfrac{1}{(s^2 + a^2)(s^2 + b^2)}$.
16. If $\vec{r} = x\vec{i} + y\vec{j} + z\vec{k}$, then prove that $\nabla r^n = nr^{n-2}\vec{r}$.
17. If $f(x) = \frac{1}{2}(\pi - x)$, find the Fourier coefficients $a_0$ and $a_n$.

18. Solve $px + qx + \sqrt{1 + p^2 + q^2}$.
19. Find the directional derivative of $\phi = xy + yz + zx$ in the direction of the vector $\vec{i} + 2\vec{j} + 2\vec{k}$ at (1,2,0).

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

Answer any **THREE** questions

20. Solve (mz - ny)p + (nx - lz)q = ly - mx.
21. Find (i) Laplace transform of $[\frac{sin3tcost}{t}]$ (ii) Laplace transform of $[te^{-t}sint]$.
22. Find inverse Laplace transform of (i) $[\frac{s-3}{s^2+4s+13}]$, (ii) $[\frac{1}{s(s^2-2s+5)}]$
23. Verify Green's theorem for $\int_C [(x^2 - y^2)dx + 2xydy]$ , where C is the boundary of the rectangle in the XOY-plane bounded by the lines x=0,x=a,y=0 and y=b.
24. Expand $f(x) = x(2\pi - x)$ as Fourier series in $(0, 2\pi)$ and hence deduce $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + ... = \frac{\pi^2}{6}$.

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