B.Sc DEGREE EXAMINATION,APRIL 2019
I Year II Semester
Integral Calculus and Fourier Series

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

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

Answer any **TEN** questions

1. State Bernoulli's formula for integration.
2. Evaluate $\int x^4 \sin(\frac{x}{2})$dx.
3. Evaluate $\int_0^1 \int_0^2 (x^2+y^2)$dydx
4. Evaluate $\int_0^{\frac{\pi}{2}} \int_0^{acos} \int_0^{\sqrt{a^{2-x^2}}} dzdrd\theta$
5. Define Beta function
6. write down the relation between beta and gamma function.
7. State the fourier coefficients in fourier series in [0 , 2π].
8. State Dirichlet Conditions.
9. Define Half range cosine series in (0,l).
10. Find $a_0$for the functionf(x)=x for 0<x<$\frac{\pi}{2}$
11. Evaluate $\int x^4 e^{2x}$dx
12. Prove that β(m,n)= β(n,m).

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

Answer any **FIVE** questions

13. Evaluate $\int_0^{\frac{\pi}{2}} x^n$sinxdx by using reduction formula
14. Evaluate $\int_0^1 \int_0^{1-x} \int_0^{x+y} e^z \, dxdydz.$
15. Prove that $\Gamma\frac{1}{2} = \sqrt{\pi}$
16. Obtain a Fourier expansion for the series

f(x) = $\begin{cases} -k, & -\pi < x < 0 \\ k, & 0 < x < \pi \end{cases}$

17. Obtain a sine series for unity in 0<x< π
18. Prove that $\frac{\beta(m+1,n)}{m} = \frac{\beta(m\ ,n)}{m+n}$
19. Evaluate $\int (x^3 logx)^2$ dx

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

Answer any **THREE** questions

20. If $I_n = \int_0^{\frac{\pi}{2}} x^n cosx\ dx$ Show that I_n +n(n-1) I_{n-2}= $(\frac{\pi}{2}\ )^n$ for n > 1 .
21. Change the order of integration and hence evaluate $\int_0^a \int_0^x \frac{cosy}{\sqrt{(a-x)\,(a-y)}}$ dxdy
22. Show that β(m,n) = $\int_0^1 \frac{x^{m-1}+x^{n-1}}{(1+x)^{m+n}}$ dx
23. Find the fourier series expansion of xsinx in the interval $-\pi \leq x \leq \pi$.
24. Find the Half range sine series of f(x)= xcosx in (0,π).

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