

## Topic :-INTEGRALS

1. The value of the integral  $\int_0^\pi \log(1 + \cos x) dx$  is  
 a)  $\frac{\pi}{2} \log 2$                       b)  $-\pi \log 2$                       c)  $\pi \log 2$                       d) None of these
  
2.  $\int e^{\tan^{-1} x} \left( \frac{1+x+x^2}{1+x^2} \right) dx$  is equal to  
 a)  $x e^{\tan^{-1} x} + C$                       b)  $x^2 e^{\tan^{-1} x} + C$                       c)  $\frac{1}{x} e^{\tan^{-1} x} + C$                       d) None of these
  
3. Let  $I_1 = \int_a^{\pi-a} x f(\sin x) dx$ ,  $I_2 = \int_a^{\pi-a} f(\sin x) dx$ , then  $I_2$  is equal to  
 a)  $\frac{\pi}{2} I_1$                       b)  $\pi I_1$                       c)  $\frac{2}{\pi} I_1$                       d)  $2I_1$
  
4.  $\int \cos^{-1} \left( \frac{1}{x} \right) dx$  equals  
 a)  $x \sec^{-1} x + \cosh^{-1} x + c$                       b)  $x \sec^{-1} x - \cosh^{-1} x + c$   
 c)  $x \sec^{-1} x - \sin^{-1} x + c$                       d) None of these
  
5. The value of  $\int_0^1 \frac{dx}{x + \sqrt{1-x^2}}$  is  
 a)  $\frac{\pi}{3}$                       b)  $\frac{\pi}{2}$                       c)  $\frac{1}{2}$                       d)  $\frac{\pi}{4}$
  
6. For any natural number  $n$ , the value of the integral  $\int_0^{\sqrt{n}} [x^2] dx$ , is  
 a)  $n\sqrt{n} + \sum_{r=1}^n \sqrt{r}$                       b)  $n\sqrt{n} - \sum_{r=1}^n \sqrt{r}$                       c)  $\sum_{r=1}^n \sqrt{r} - n\sqrt{n}$                       d) None of these
  
7.  $\int \frac{1}{x} (\log_e x) dx$  is equal to  
 a)  $\log_e(1 - \log_e x) + c$                       b)  $\log_e(\log_e x - 1) + c$   
 c)  $\log_e(\log_e x - 1) + c$                       d)  $\log_e(1 + \log_e x) + c$
  
8. Let  $f$  be integrable over  $[0, a]$  for any real  $a$ . If we define  

$$I_1 = \int_0^{\pi/2} \cos \theta f(\sin \theta + \cos^2 \theta) d\theta$$
 and  $I_2 = \int_0^{\pi/2} \sin 2\theta f(\sin \theta + \cos^2 \theta) d\theta$ , then  
 a)  $I_1 = I_2$                       b)  $I_1 = -I_2$                       c)  $I_1 = 2I_2$                       d)  $I_1 = -2I_2$

9. Consider the following statements:

1.  $\int_{-\pi/2}^{\pi/2} \sqrt{\cos x - \cos^3 x} dx = \frac{3}{4}$

2.  $\int_0^4 (|x - 1| + |x - 3|) dx = 10$

Which of these is/are correct?

- a) Only (1)                      b) Only (2)                      c) Both of these                      d) None of these

10. The value of the integral  $\int_{-\pi/4}^{\pi/4} \sin^{-4} x dx$  is

- a)  $-\frac{8}{3}$                       b)  $\frac{3}{2}$                       c)  $\frac{8}{3}$                       d) None of these

11. The value of  $\lim_{x \rightarrow \infty} \frac{(\int_0^x e^x dx)^2}{\int_0^x e^{2x^3} dx}$ , is

- a) 1                      b) 2                      c) 3                      d) 0

12. If  $\int_{\sin x}^1 t^2 f(t) dt = 1 - \sin x, \forall x \in [0, \pi/2]$ , then  $f\left(\frac{1}{\sqrt{3}}\right)$  is

- a) 3                      b)  $\sqrt{3}$                       c)  $\frac{1}{3}$                       d) None of these

13. If  $a$  is fixed real number such that  $f(a - x) + f(a + x) = 0$ , then  $\int_0^{2a} f(x) dx =$

- a)  $\frac{a}{2}$                       b) 0                      c)  $-\frac{a}{2}$                       d)  $2a$

14.  $\int \frac{dx}{\sin(x - a) \sin(x - b)}$  is

- a)  $\frac{1}{\sin(a - b)} \log \left| \frac{\sin(x - a)}{\sin(x - b)} \right| + c$   
 b)  $\frac{-1}{\sin(a - b)} \log \left| \frac{\sin(x - a)}{\sin(x - b)} \right| + c$   
 c)  $\log \sin(x - a) \sin(x - b) + c$   
 d)  $\log \left| \frac{\sin(x - a)}{\sin(x - b)} \right| + c$

15. Let  $\int \sqrt{\frac{5-x}{2+x}} dx$  equal

- a)  $\sqrt{x + 2} \sqrt{5 - x} + 3 \sin^{-1} \sqrt{\frac{x + 2}{3}} + C$   
 b)  $\sqrt{x + 2} \sqrt{5 - x} + 7 \sin^{-1} \sqrt{\frac{x + 2}{7}} + C$   
 c)  $\sqrt{x + 2} \sqrt{5 - x} + 5 \sin^{-1} \sqrt{\frac{x + 2}{5}} + C$   
 d) None of these

16.  $\int \frac{2x^2 + 3}{(x^2 - 1)(x^2 + 4)} dx = a \log \left( \frac{x + 1}{x - 1} \right) + b \tan^{-1} \frac{x}{2}$ , then  $(a, b)$  is

- a)  $(-1/2, 1/2)$                       b)  $(1/2, 1/2)$                       c)  $(-1, 1)$                       d)  $(1, -1)$

17.  $\int e^{x\frac{(x-1)}{x^2}} dx$  is equal to

a)  $\frac{e^x}{x^2} + c$

b)  $\frac{-e^x}{x^2} + c$

c)  $\frac{e^x}{x} + c$

d)  $\frac{-e^x}{x} + c$

18. The value of the integral  $\int_0^{3\alpha} \operatorname{cosec}(x - \alpha)\operatorname{cosec}(x - 2\alpha)dx$ , is

a)  $2\sec a \log\left(\frac{1}{2} \operatorname{cosec} \alpha\right)$  b)  $2\sec a \log\left(\frac{1}{2} \sec \alpha\right)$  c)  $2 \operatorname{cosec} a \log(\sec \alpha)$  d)  $2 \operatorname{cosec} a \log\left(\frac{1}{2} \sec \alpha\right)$

19.  $\int_0^3 \frac{3x+1}{x^2+9} dx$  is equal to

a)  $\log(2\sqrt{2}) + \frac{\pi}{12}$

b)  $\log(2\sqrt{2}) + \frac{\pi}{2}$

c)  $\log(2\sqrt{2}) + \frac{\pi}{6}$

d)  $\log(2\sqrt{2}) + \frac{\pi}{3}$

20.  $\int \frac{dx}{\sqrt{(1-x)(x-2)}}$  is equal to

a)  $\sin^{-1}(2x - 3) + c$

b)  $\sin^{-1}(2x + 5) + c$

c)  $\sin^{-1}(3 - 2x) + c$

d)  $\sin^{-1}(5 - 2x) + c$