

**PRACTICE QUESTIONS FOR COMPETITIVE EXAMS**  
**SUB: MATHEMATICS**  
**TOPIC: DEFINITE INTEGRAL**

SELECT THE CORRECT ALTERNATIVE (ONLY ONE CORRECT ANSWER)

1. If  $\int_0^{\pi/3} \frac{\cos x}{3+4 \sin x} dx = k \log \left( \frac{3+2\sqrt{3}}{3} \right)$  then k is-  
 (A)  $\frac{1}{2}$  (B)  $\frac{1}{3}$  (C)  $\frac{1}{4}$  (D)  $\frac{1}{8}$
2.  $\int_{e^{-1}}^{e^2} \frac{dx}{x \ln x \cdot \ln(\ln x) \cdot \ln(\ln(\ln x))}$  equals -  
 (A) 1 (B)  $1/e$  (C)  $e - 1$  (D)  $1 + e$
3. The value of the definite integral  $\int_1^2 (e^{x+1} + e^{2-x})^{-1} dx$  is  
 (A)  $\frac{\pi}{4e^2}$  (B)  $\frac{\pi}{4e}$  (C)  $\frac{1}{e^2} \left( \frac{\pi}{2} - \tan^{-1} \frac{1}{e} \right)$  (D)  $\frac{\pi}{2e^2}$
4. The value of the definite integral  $\int_1^e ((x+1)e^x \cdot \ln x) dx$  is -  
 (A) e (B)  $e^e - 1$  (C)  $e^e(e - 1)$  (D)  $e^e(e - 1) + e$
5. Let a, b, c be non-zero real numbers such that :  $\int_0^1 (1 + \cos^8 x)(ax^2 + bx + c) dx = \int_0^2 (1 + \cos^8 x)(ax^2 + bx + c) dx$ ,  
 then the quadratic equation  $ax^2 + bx + c = 0$  has -  
 (A) no root in (0,2) (B) atleast one root in (0,2)  
 (C) a double root in (0,2) (D) none
6. If  $f(x) = A \sin \left( \frac{\pi x}{2} \right) + B$ ,  $f\left(\frac{1}{2}\right) = \sqrt{2}$  and  $\int_0^1 f(x) dx = \frac{2A}{\pi}$ , then the constant A and B are-  
 (A)  $\frac{\pi}{2}$  and  $\frac{\pi}{2}$  (B)  $\frac{2}{\pi}$  and  $3\pi$  (C) 0 and  $-\frac{4}{\pi}$  (D)  $\frac{4}{\pi}$  and 0
7. If  $I_n = \int_0^{\pi/4} \tan^n x dx$  then  $\lim_{n \rightarrow \infty} n (I_n + I_{n+2}) =$   
 (A) 1 (B) 1/2 (C)  $\infty$  (D) 0
8.  $\int_0^{\pi} \frac{x \tan^{-1} x}{(1+x^2)^2} dx$   
 (A)  $\frac{\pi}{2}$  (B)  $\frac{\pi}{4}$  (C)  $\frac{\pi}{6}$  (D)  $\frac{\pi}{8}$
9. Suppose f, f' and f'' are continuous on [0, e] and that  $f'(e) = f(e) = f(1) = 1$  and  $\int_1^e \frac{f(x)}{x^2} dx = \frac{1}{2}$ , then the value of  
 $\int_1^e f''(x) \ln x dx$  equals -  
 (A) 0 (B) 1 (C) 2 (D) none of these

10.  $\int_{1/2}^2 \frac{1}{x} \sin\left(x - \frac{1}{x}\right) dx$  has the value equal to -  
 (A) 0 (B)  $\frac{3}{4}$  (C)  $\frac{5}{4}$  (D) 2
11.  $\int_2^4 \left[ \log_x 2 - \frac{(\log_x 2)^2}{\ln 2} \right] dx =$   
 (A) 0 (B) 1 (C) 2 (D) 4
12. Suppose that  $F(x)$  is an antiderivative of  $f(x) = \frac{\sin x}{x}$ ,  $x > 0$  then  $\int_1^3 \frac{\sin 2x}{x} dx$  can be expressed as -  
 (A)  $F(6) - F(2)$  (B)  $\frac{1}{2}(F(6) - F(2))$  (C)  $\frac{1}{2}(F(3) - F(1))$  (D)  $2(F(6) - F(2))$
13.  $\int_0^{\pi} f\left(x + \frac{1}{x}\right) \cdot \frac{\ln x}{x} dx$   
 (A) is equal to zero (B) is equal to one (C) is equal to  $\frac{1}{2}$  (D) can not be evaluated
14. Integral  $\int_0^1 |\sin 2\pi x| dx$  is equal to -  
 (A) 0 (B)  $-\frac{1}{\pi}$  (C)  $\frac{1}{\pi}$  (D)  $\frac{2}{\pi}$
15.  $\int_2^3 \frac{\sqrt{x}}{\sqrt{(5-x)} + \sqrt{x}} dx =$   
 (A)  $\frac{1}{2}$  (B)  $\frac{1}{3}$  (C)  $\frac{1}{5}$  (D) none
16. For any integer  $n$  the integral  $\int_0^{\pi} e^{\cos^2 x} \cos^3(2n+1)x dx$  has the value [JEE 1985]  
 (A)  $\pi$  (B) 1 (C) 0 (D) none of these
17.  $\int_2^3 \frac{(x+2)^2}{2x^2 - 10x + 53} dx$  is equal to -  
 (A) 2 (B) 1 (C)  $1/2$  (D)  $5/2$
18. The value of the definite integral  $\int_0^1 (1 + e^{-x^2}) dx$  is- [JEE 1981]  
 (A) -1 (B) 2 (C)  $1 + e^{-1}$  (D) none of these
19.  $\int_{-\pi}^{\pi} (\cos ax - \sin bx)^2 dx$  where  $a$  and  $b$  are integer is equal to -  
 (A)  $-\pi$  (B) 0 (C)  $\pi$  (D)  $2\pi$
20. The value of  $\int_{-\pi}^{\pi} (1 - x^2) \sin x \cos^2 x dx$  is -  
 (A) 0 (B)  $\pi - \frac{\pi^3}{3}$  (C)  $2\pi - \pi^3$  (D)  $\frac{7}{2} - 2\pi^3$

#### ANSWER KEY

Qn.	1	2	3	4	5	6	7	8	9	10
Ans	C	A	A	D	B	D	A	D	D	A
Qn.	11	12	13	14	15	16	17	18	19	20
Ans.	A	A	A	D	A	C	C	D	D	A