1. If $\int \frac{a^x e^{2x}}{b^x c^x} dx = \frac{1}{k}\left(\frac{a^x e^{2x}}{b^x c^x}\right) + \ell$ then k =

(1) log b + log c – log a – 2
(2) log (e^2 abc)
(3) log a – log b – log c + 2
(4) 2 log a + log b – log c

2. $\int \frac{\sec^2 x}{\log(\tan x)^{\tan x}} dx =$

(1) log $\left|\log(\tan x)^{\tan x}\right|$ + c
(2) log(tanx) + c
(3) log $\left|\log(\tan x)\right|$ + c
(4) log $\left|\frac{\log \tan x}{\tan x}\right| + c$

3. $\int \frac{\cos x}{\cos(x-a)} dx - \int \frac{\sin x}{\sin(x-a)} dx =$

(1) 2x cos a + c
(2) sin a log $\left|\tan(x-a)\right|$ + c
(3) log $\left|\cot(x-a)\right|$c
(4) None of these

4. $\int \frac{\cos x + x \sin x}{x(x-\cos x)} dx =$

(1) $\log\left|x(x-\cos x)\right| + c$ (2) $\log\left|1 - \frac{\cos x}{x}\right| + c$

(3) log $\left|\frac{x}{x-\cos x}\right|$ + c (4) None of these

5. $\int \frac{\sin^{-1} x - \cos^{-1} x}{\sin^{-1} x + \cos^{-1} x} dx =$

(1) $\frac{4}{\pi}\left(x \sin^{-1} x + \sqrt{1-x^2}\right) - x + c$

(2) $\log\left|\sin^{-1} x + \cos^{-1} x\right| + c$

(3) $\frac{4}{\pi}\left(x \sin^{-1} x + \sqrt{1-x^2}\right) + c$

(4) None of these

6. $\int \sqrt{(\sin^2 x)}\ dx$ = ; ($x \neq np$, $n \in I$)

(1) – cos x + c
(2) cos x + c
(3) – cos x sgn. (sin x) + c
(4) None of these

7. $\int \frac{\cos^2 x\, dx}{\cos^2 x + 9\sin^2 x} =$

(1) $\frac{1}{8}$ [3 $\tan^{-1}$(3 tan x) – x] + c
(2) $\frac{1}{9}$ [3 $\tan^{-1}$ (3 tan x) + x] + c
(3) $8\left[\frac{1}{27}\tan^{-1}(3\tan x) - x\right]$ + c
(4) None of these

8. If $\ell^r(x)$ means (log log log..... log x); the log being repeated r times, then $\int \{x\ell(x)\ell^2(x)\ell^3(x)...\ell^r(x)\}^{-1} dx$ is equal to

(1) $\ell^{r+1}(x)$ + c (2) $\frac{\ell^{r+1}(x)}{r+1}$ + c
(3) $\ell^r(x)$ + c (4) None of these

9. $\int e^{\tan^{-1} x}(1 + x + x^2)\, d(\cot^{-1} x) =$

(1) $e^{\tan^{-1} x}$ + c (2) $-e^{\tan^{-1} x}$ + c
(3) – $xe^{\tan^{-1} x}$ + c (4) $xe^{\tan^{-1} x}$ + c

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

then a, b are respectively
(1) 11/12, 5/6 (2) 11/12, – 5/6
(3) – 11/12, 5/6 (4) None of these

11. $\int e^x \frac{(x^3+x+1)}{(1+x^2)^{3/2}} dx =$

(1) $\frac{xe^x}{(1+x^2)^{3/2}}$ + c (2) $\frac{x^2e^x}{(1+x^2)^{1/2}}$ + c

(3) $\frac{xe^x}{(1+x^2)^{1/2}}$ + c (4) None of these

12. $\int \frac{dx}{\left(1+\sqrt{x}\right)\sqrt{x-x^2}} =$

(1) $\frac{2\left(\sqrt{x}-1\right)}{\sqrt{x-1}} + c$ (2) $\frac{2\left(1+\sqrt{x}\right)}{\sqrt{x-1}} + c$

(3) $\frac{2\left(1+\sqrt{x}\right)}{\sqrt{1-x}} + c$ (4) $\frac{2\left(\sqrt{x}-1\right)}{\sqrt{1-x}} + c$

13. $\int \frac{(ax^2-b)}{x\sqrt{c^2x^2-(ax^2+b)^2}}dx =$

(1) $\sin^{-1}\left(\frac{ax+\frac{b}{x}}{c}\right)+K$ (2) $\sin^{-1}\left(\frac{ax^2+\frac{b}{x^2}}{c}\right)+K$

(3) $\cos^{-1}\left(\frac{ax+\frac{b}{x}}{c}\right)+K$ (4) $\cos^{-1}\left(\frac{ax^2+\frac{b}{x^2}}{c}\right)+K$

14. If $\int \frac{x^4+1}{x(x^2+1)^2}dx = A\,\ell n\,|x| + \frac{B}{1+x^2} + C$, where C is integration constant, then :-

(1) A = 1, B = –1 (2) A = –1, B = 1

(3) A = –1, B = –1 (4) A = 1, B = 1

15. $\int \frac{5x^4+4x^5}{(x^5+x+1)^2}dx =$

(1) $\frac{x}{x^5+x+1}+C$ (2) $\frac{x^5}{x^5+x+1}+C$

(3) $-\frac{x^5}{x^5+x+1}+C$ (4) None

16. $\int \{\sin(\ell n\,x)+\cos(\ell n\,x)\}dx =$

(1) $\frac{\sin(\ell n\,x)}{x}+C$ (2) $\frac{\cos(\ell n\,x)}{x}$

(3) x sin (ℓn x) + C (4) xcos(ℓn x) + C

17. $\int \frac{dx}{x^2(1+x^n)^{\frac{n-1}{n}}} =$

(1) $-\left(\frac{1+x^n}{x^n}\right)^{\frac{1}{n}}+C$ (2) $\left(\frac{1+x^n}{x^n}\right)^{\frac{1}{n}}+C$

(3) $\left(\frac{x^n}{1+x^n}\right)^{\frac{1}{n}}+C$ (4) $-\left(\frac{x^n}{1+x^n}\right)^{\frac{1}{n}}+C$

18. $\int \frac{x^2+\cos^2 x}{1+x^2}\,\text{cosec}^2x\,dx =$

(1) cot x – cot^{-1} x + C (2) –cot x + cot^{-1}x + C

(3) tan x + tan^{-1} x + C (4) None

19. $\int \sin^{-1/2}x\cos^{-7/2}x\,dx =$

(1) $\tan^{1/2}x+\tan^{5/2}x+C$

(2) $2\tan^{1/2}x+\frac{1}{5}\tan^{5/2}x+C$

(3) $2\tan^{1/2}x+\frac{2}{5}\tan^{5/2}x+C$

(4) None

20. $\int \frac{dx}{\sin^6 x+\cos^6 x} =$

(1) tan^{-1} (tanx – cotx) + C

(2) tan^{-1}(tanx + cotx) + C

(3) tan^{-1}(tan x/2) + C

(4) None

21. $\int \frac{e^{\tan^{-1}x}}{(1+x^2)}\left[\left(\sec^{-1}\sqrt{1+x^2}\right)^2+\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)\right]dx$ (x > 0) equals -

(1) $e^{\tan^{-1}x}\cdot\tan^{-1}x+C$

(2) $\frac{e^{\tan^{-1}x}.(\tan^{-1}x)^2}{2}+C$

(3) $e^{\tan^{-1}x}.\left(\sec^{-1}\sqrt{1+x^2}\right)^2+C$

(4) $e^{\tan^{-1}x}.\left(\text{cosec}^{-1}\sqrt{1+x^2}\right)^2+C$

22. $\int \frac{px^{p+2q-1} - qx^{q-1}}{x^{2p+2q} + 2x^{p+q} + 1}\,dx$ is equals :-

(1) $\frac{-x^p}{x^{p+q}+1} + C$ (2) $\frac{x^q}{x^{p+q}+1} + C$

(3) $\frac{-x^q}{x^{p+q}+1} + C$ (4) $\frac{x^p}{x^{p+q}+1} + C$

23. Primitive of $(x^2 + 4)^{-1/2}$ w.r.t. $x^2 + 2$ is equal to :-

(1) $\frac{2}{\sqrt{x^2+4}} + C$ (2) $\sqrt{x^2+4} + \frac{1}{\sqrt{x^2+4}} + C$

(3) $2\sqrt{x^2+4} + C$ (4) None

24. $\int (\sqrt{\tan x} + \sqrt{\cot x})\,dx$:-

(1) $\sin^{-1}(\sin x - \cos x) + C$

(2) $\sqrt{2}\sin^{-1}(\sin x - \cos x) + C$

(3) $\sqrt{2}\cos^{-1}(\sin x - \cos x) + C$

(4) None

25. Let f be a polynomial function such that $\forall x \in R$ $f(x^2 + 1) = x^4 + 5x^2 + 3$ then the primitive of f(x) w.r.t. x is

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

(3) $\frac{x^3}{3} - \frac{3x^2}{2} - x + c$ (4) $\frac{x^3}{3} + \frac{3x^2}{2} + x + c$

26. Which of the following definite integrals have a non zero value

(1) $\int_0^{\pi/2} \ell n(\cot x)\,dx$ (2) $\int_0^{2\pi} \sin^3 x\,dx$

(3) $\int_{1/e}^{e} \frac{dx}{x(\ell n\, x)^{1/3}}$ (4) None of these

27. If f(0) = 1; f(2) = 3; f'(2) = 5 then the value of the definite integral $\int_0^1 xf''(2x)\,dx$ =

(1) 3 (2) $\frac{3}{2}$

(3) $\frac{5}{2}$ (4) 2

28. If $F(x) = \int_2^{\sin x} (t^2 + 3)\,dt$, then the number of solution of equation F'(x) = 3cosx; $x \in [0, 2\pi]$ is

(1) 3 (2) 4 (3) 5 (4) 6

29. Value of the definite integral $\int_{-1}^{1} \frac{dx}{\left(1 + x^3 + \sqrt{1+x^6}\right)}$

(1) 1 (2) $-\ell n2$ (3) $\ell n2$ (4) 0

30. $\int_1^e \frac{dx}{\ell n(x^x e^x)}$ equals

(1) 1 (2) $-\ell n2$ (3) $\ell n2$ (4) 0

ANSWER KEY — Exercise-I

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	**3**	**3**	**4**	**2**	**1**	**3**	**1**	**1**	**3**	**1**
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	**3**	**4**	**1**	**4**	**2**	**3**	**1**	**2**	**3**	**1**
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	**3**	**3**	**3**	**2**	**1**	**4**	**4**	**3**	**1**	**3**