CHAPTER 7
INTEGRALS

ASSERTION REASON TYPE QUESTIONS

The following questions consist of two statements – Assertions(A) and Reason(R). Answer these questions selecting the appropriate option given below:

(a) Both A and R are true and R is the correct explanation for A
(b) Both A and R are true and R is not the correct explanation for A
(c) A is true but R is false
(d) A is false but R is true

S. NO.	QUESTIONS
1.	$Assertion(A)$: $\int_{-1}^{1} \log\left(\frac{1+x}{1-x}\right)$ dx = 0 Reason(R) : If f(x) is an even function then $\int_{-1}^{1} f(x)\ dx = 0$
2.	A: $\int e^x$(sinx+cosx)dx = e^x sinx + c R: $\int e^x$(f(x)+f'(x))dx = e^x f(x) + c
3.	A: $\int[(\sin(logx) + \cos(logx)]\ )\ dx =$ xsin(logx) + c R: $\frac{d}{dx}$(xsin(logx)) = sin(logx) + cos(logx)
4.	A: $\int f(x)dx =$ f'(x) + c R: $\frac{d}{dx}\int f(x)dx$ = f (x)
5.	A: Derivative of a function at a point exists R: Integration of a function at a point where it Is defined , exists
6.	Assertion : $\int_{-2}^{2} log\frac{(1+x)}{(1-x)}dx$=0 Reason : If f is an odd function, then $\int_{-a}^{a} f(x)dx = 0$
7.	Assertion: Geometrically, derivative of a function is the slope of the tangent to the corresponding curve at a point. Reason: Geometrically, indefinite integral of a function represents a family of curves parallel to

	each other.
8.	Assertion: Derivative of a function at a point exists. Reason: Integral of a function at a point where it is defined, exists.
9.	Assertion: If $\frac{d}{dx}\int f(x)dx = f(x)$, then $\int f(x)dx = f'(x) + C$, where C is an arbitrary constant. Reason: Process of differentiation and integration are inverses of each other.
10.	Assertion : The value of the integral $\int e^x(\tan x + sec^2 x)dx = e^x \tan\ x + C$ Reason: The value of the integral $\int e^x\{f(x) + f'(x)\}dx = e^x f(x) + C$.
11.	Assertion : If the derivative of function x is $\frac{d}{dx}(x) = 1$,then its anti-derivatives or integral is $\int(1)dx = x + c$. Reason : If $\frac{d}{dx}\left(\frac{x^{n+1}}{n+1}\right) = x^n$,then the corresponding integral of the function is $\int x^n\ dx = \frac{x^{n+1}}{n+1} + c, \quad n \neq -1$
12.	Assertion: It is not possible to find $\int e^{-x^2}\ dx$ by inspection method. Reason : Function is not expressible in terms of elementary functions
13.	Assertion : If $\frac{d}{dx}\int f(x)dx = f(x)$, then $\int f(x)dx = f^{'}(x) + c$, where C is an arbitrary constant. Reason : Process of differentiation and integration are inverses of each other.
14.	Assertion : $\int[sin(logx) + cos(logx)]\ dx = x\ sin(logx) + c$ Reason : $\frac{d}{dx}[x\ sin(logx)] = sin(logx) + cos(logx)$
15.	Assertion : Geometrically, derivative of a function is the slope of the tangent to the corresponding curve at a point. Reason : Geometrically, indefinite integral of a function represents a family of curves parallel to each other.
16.	Assertion: $\int \frac{dx}{x^3\sqrt{1+x^4}} = -\frac{1}{2}\sqrt{\left(1 + \frac{1}{x^4}\right)} + C$. Reason: For integration by parts, we follow ILATE rules.
17.	Assertion: Let F(x) be an indefinite integral of $\sin^2 x$. F(x) satisfies $F(x+\pi) = F(x)$ for all real x, Reason: $\sin^2(\pi+x) = \sin^2 x$ for all real x.
18.	Assertion : The value of the integral $\int \frac{e^{3x}+e^x}{e^{4x}+1} dx$ is $\frac{1}{\sqrt{2}} tan^{-1}\left(\frac{e^x - e^{-x}}{\sqrt{2}}\right) + C$ Reason: A primitive of the function $f(x) = \frac{x^2+1}{X^4+1}$ is $\frac{1}{\sqrt{2}} tan^{-1}\left(\frac{x^2-1}{\sqrt{2}x}\right)$.
19.	Assertion : If $I_1 = \int \frac{e^x}{e^{4x}+e^{2x}+1} dx$ and $I_2 = \int \frac{e^{-x}}{e^{-4x}+e^{-2x}+1} dx$, then $I_2 - I_1 = \frac{1}{2} log\left(\frac{e^{2x}-e^x+1}{e^{2x}+e^x+1}\right) + C$ Reason: A primitive root of f(x)= $\frac{x^2-1}{x^4+x^2+1}$ is $\frac{1}{2} log(\frac{x^2-x+1}{x^2+x+1})$

20.	Assertion : $\int \frac{dx}{x^2(x^4+1)^{\frac{3}{4}}} = -\left(1+\frac{1}{x^4}\right)^{\frac{1}{4}} + C.$ Reason: For integration by parts, we follow ILATE rules.
21.	Assertion: $\int \frac{1}{\sqrt{1-x^2}}dx = \sin^{-1}x + \text{C}$, where C is a constant Reason: Since $\frac{d}{dx}(\sin^{-1}x) = \frac{1}{\sqrt{1-x^2}}$ $\therefore \int \frac{1}{\sqrt{1-x^2}}dx = \sin^{-1}x + \text{C}$
22.	Assertion: $\int \frac{1}{\sqrt{x}}dx = 2\sqrt{x} + \text{C}$ Reason: $\int \cos x\, dx = \sin x + \text{C}$
23.	Assertion: $\int e^x[f(x) + f'(x)]dx = e^x f(x) + \text{C}$ Reason: $\int e^x \sec x\,[1+\tan x]dx = e^x \tan x + \text{C}$
24.	Assertion: $\int uv\, dx = u\int v\, dx - \int\left\{\frac{du}{dx}\int vdx\right\}dx + \text{C}$, Where *u* and *v* are functions of *x*. Reason: $\int \cos^4 x \sin x\, dx = -\frac{1}{5}\cos^5 x + \text{C}$
25.	Assertion: $\int \frac{1}{\sqrt{x^2-a^2}}\, dx = \log\left\|x + \sqrt{x^2-a^2}\right\| + \text{C},$ Reason: $\int \frac{1}{\sqrt{x^2+2x-3}}dx = \log\left\|(x+1) + \sqrt{x^2 + 2x - 5}\right\| + \text{C}$
26.	Assertion(A): $\int \frac{1}{x}dx = \int x^{-1}dx = \frac{x^0}{0} + C$ *which is not defined*Reason(R) : $\int x^n dx = \frac{x^{n+1}}{n+1} + C\ ,\ n \neq -1$
27.	Assertion (A): An indefinite integral is collection of family of curves, each of which is obtained by translating one of the curves parallel to itself upwards or downwards along the y-axis. Reason(R): The different values of constant of integration will correspond to different members of this family and these members can be obtained by shifting any one of the curves parallel to it.
28.	Assertion (A): The integral of a function is not unique. Reason(R): The integral of a function are unique upto an additive constant i.e., any two integrals of a function differ by a constant.

29.	Assertion (A): If $f'(x) = x^4 + 3x - 9, then\ f(x) = \frac{x^5}{5} + 3\frac{x^2}{2} - 9x$ Reason(R):$f(x) = \int f'(x)dx$
30.	Assertion (A):$\int sinmxdx = \frac{-cosmx}{m} + C$ Reason(R): $\int f'(kx)dx = \frac{f(x)}{k} + C$ where k is a constant
31.	Assertion (A): f ' (x) =$\frac{1}{x}$+ x Reason (R) : f(x) = log x +$\frac{x^2}{2}$+ C
32.	Assertion(A): Integral I = $\int \frac{2x+3}{x^2+3x+7}$ dx = log $\|x^2 + 3x + 7\|$ + C Reason (R): I= $\int \frac{f'(x)}{f(x)}$ dx = log |f(x)| + C
33.	Assertion (A): A function F is an ant derivative of the function on [a,b] . Reason (R): F is continuous in [a, b] and differentiable in (a,b)
34.	Assertion (A): Partial fraction method of integration is applicable . Reason (R): Degree of numerator > Degree of denominator
35.	Assertion (A):integration by part is applicable in integrating product of the function. Reason (R): integration by part is applicable to product of the function in all cases.
36.	Assertion:$\int_0^{\frac{\pi}{4}} sec^2xdx$=1 Reason: $\frac{d}{dx} tanx = sec^2x$
37.	Assertion:$\int_0^1 \frac{1}{\sqrt{1+x^2}} dx$=0 Reason: $\int \frac{1}{\sqrt{a^2+x^2}} dx = log\left\|x + \sqrt{a^2 + x^2}\right\|$+C
38.	Assertion:$\int_0^{\frac{\pi}{2}} sinxdx$=1 Reason: $If g(x) is continuous in [a, b] and \int g(x)\, dx = f(x), then \int_a^b g(x)\, dx = f(b) - f(a)$
39.	Assertion:$\int_0^{\frac{\pi}{2}} sinxdx$=1 Reason: $If g(x) is continuous in [a, b] and \int g(x)\, dx = f(x), then \int_a^b g(x)\, dx = f(b) - f(a)$
40.	Assertion:$\int_0^{\pi} cot^6xdx$= 2 $\int_0^{\frac{\pi}{2}} cot^6xdx$ Reason: cot^6x is an even function.

41.	Assertion(A) : $\int_0^1 \frac{1}{1+x^2}\,dx = \pi/4$ Reason(R): since $\frac{d}{dx}\tan^{-1}x = 1/{1+x^2}$ and $\int \frac{1\,dx}{1+x^2} = \tan^{-1}x + c$
42.	Assertion(A): $\int_0^4 \frac{1}{2\sqrt{x}}\,dx = 2$ Reason(R) : $\int \cos x\,dx = \sin x + c$
43.	Assertion(A): If f '(x) = x + $\frac{1}{1+x^2}$ and f(0) = 0 then f(x) = $\frac{x^2}{2} + \tan^{-1}x$ Reason(R) : $\int x^n\,dx = \frac{x^{n+1}}{n+1} + c$ where n ≠ -1
44.	Assertion(A): $\int_0^{\pi/2} \cos x\,dx = 1$ Reason(R) : If f(x) is continuous in [a,b] and $\int f(x)\,dx =$ $\phi(x)$ then $\int_a^b f(x)\,dx$ = $\phi(b) - \phi(a)$
45.	Assertion(A) $\int_0^1 \frac{1}{\sqrt{1-x^2}}\,dx = \frac{\pi}{2}$ Reason(R) : $\int \frac{1}{a^2+x^2}\,dx = \frac{1}{a}\tan^{-1}\frac{x}{a} + c$
46.	Assertion (A): $\int_0^{\pi/2} \frac{\sqrt{\cos x}}{\sqrt{\cos x}+\sqrt{\sin x}}\,dx = \frac{\pi}{4}$ Reason (R) : $\int_0^{\pi/2} \frac{\sqrt{\sin x}}{\sqrt{\cos x}+\sqrt{\sin x}}\,dx = \frac{\pi}{4}$
47.	Assertion (A): $\int_{-3}^{3}(x^3+5)\,dx = 30$ Reason (R) : f(x) = x^3 +5 is and odd function
48.	Assertion (A): $\int_{-\pi/2}^{\pi/2} \sin^2 x\,dx = \frac{\pi}{2}$ Reason (R) :If f(x) is and odd function , then $\int_{-a}^{a} f(x)dx = 2\int_0^a f(x)dx$
49.	Assertion (A): $\frac{d}{dx}\left[\int_0^{x^2} \frac{dx}{x^2+4}\right] = \frac{2x}{x^2+4}$ Reason (R) : $\int \frac{dx}{x^2+a^2} = \frac{1}{a}\tan^{-1}(\frac{x}{a})$ +c
50.	Assertion (A): $\int \int_0^{\pi/2} \log(1+\cos x)$ dx = - π log 2 Reason (R) : If f(x) is any function, then $\int_0^a f(x)dx = \int_0^a f(a-x)dx$
51.	Assertion : $\int_{-3}^{3}(x^3+5)dx = 30$ Reason: f(x) is an odd function

52.	Assertion : $\int_0^{\frac{\pi}{2}} \frac{\cos x\, dx}{\sin x+\cos x} = \pi/4$ Reason : $\int_0^{\frac{\pi}{2}} \frac{\cos x\, dx}{\sin x+\cos x} = \pi/4$
53.	Assertion : $\int_2^3 \frac{1}{x} dx = \log\frac{2}{3}$ Reason : $\frac{d}{dx}\ \log x = \frac{1}{x}$
54.	Assertion : $\int_0^a f(x) dx = \int_0^a f(a-x) dx$ Reason : $\int_0^\pi x \sin x \cos^2 x\, dx = \frac{\pi}{3}$
55.	Assertion : $\int_0^{\pi/2} e^x(\sin x - \cos x) dx = 1$ Reason: $\int_0^a e^x[f(x) + f'(x)]dx = e^x f(x)$
56.	Assertion : $\int_{-\pi/2}^{\pi/2} f(x)$ dx = 4 ,where f(x) = sin |x| + cos |x| Reason : f(x) is an odd function , if f(-x) = - f(x)
57.	Assertion : $\int_a^b f(x)$ dx = $\int_a^c f(x)$ dx + $\int_c^b f(x)$ dx , where a $< c < b$. Reason: Let f(x) be a continuous function defined on an interval [a ,b] and let the antiderivative of f(x) be F(x). Then the definite integral of f(x) over [a, b] , denoted by $\int_a^b f(x)$ dx , is given by $\int_a^b f(x)$ dx = $[F(x)]_a^b$ = F(b) – F(a)
58.	Assertion : The value of $\int_{\pi/6}^{\pi/3} \frac{1}{1+\sqrt{\tan x}}$ dx is $\pi/12$ Reason : The property of definite integral is $\int_0^{2a} f(x)$ dx = 0 , if f(x) = f(2a –x)
59.	Assertion : The value of $\int_0^\pi \frac{x}{1+\sin x}$ dx is 2πReason : $\int_0^a f(x)$ dx = $\int_0^a f(a-x)$ dx
60.	Assertion : $\int_a^b f(g(x))g'(x)$ dx = $\int_{g(a)}^{g(b)} f(t)$dt Reason : substitute g(x) = t then $g'(x)$ dx = dt. When x = a , t = g(a) and x = b , t = g(b).
61.	Assertion: $\int_{-2}^{2} \log\left(\frac{1+x}{1-x}\right) dx = 0$

	Reason: If f is an odd function, then $\int_{-a}^{a} f(x)dx = 0$
62.	Assertion: $\int_{0}^{\frac{\pi}{2}} \sqrt{tanx}\ dx = \frac{\pi}{\sqrt{2}}$ Reason: $tanx = t^2$ makes the Integrands a rational function
63.	Assertion: $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \lvert sinx \rvert\ dx$ is equal to 2. Reason: $\int_{a}^{b} f(x)dx = \int_{a}^{c} f(x)dx + \int_{c}^{b} f(x)dx$, where $c \in (a, b)$
64.	Assertion: $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{1}{1+\sqrt{cotx}}\ dx$ is equal to $\frac{\pi}{6}$ Reason: $\int_{a}^{b} f(x)dx = \int_{a}^{b} f(a+b-x)dx$
65.	Assertion: $\int_{0}^{10} \{x-[x]\}\ dx$ is equal to 5. Reason: $\int_{a}^{na} f(x)dx = n \int_{0}^{a} f(x)dx$
66.	Assertion: $\int_{-5}^{5} \lvert x-2 \rvert\ dx$ = 29. Reason: $\int_{a}^{b} f(x)dx = \int_{a}^{c} f(x)dx + \int_{c}^{b} f(x)dx$,
67.	Assertion: $\int_{0}^{10} (x - [x])$ dx = 5. Reason: $\int_{-a}^{a} f(x)dx = 2 \int_{0}^{a} f(x)dx$
68.	Assertion: $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{1}{1+\sqrt{cotx}}$ = 6 Reason: If f(x) is a continuous function defined on [a, b] , then $\int_{a}^{b} f(x)dx = \int_{a}^{b} f(a+b-x)\ dx$
69.	Assertion: $\int_{0}^{\frac{\pi}{2}} \sqrt{tanx}\ \ dx = \frac{\pi}{2}$ Reason: $\tan x = t^2$ makes the Integrands a rational function.
70.	Assertion: $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \log(\frac{a-\sin\theta}{a+\sin\theta})$ dθ = 0

	Reason: If f is an odd function, then $\int_{-a}^{a} f(x)dx$ =0
71.	Assertion:$\int_{-\pi/2}^{\pi/2} sin^7 x\, dx = 0$. Reason:If $f(x)$ is a continuous function defined on $[-a, a]$, then $\int_{-a}^{a} f(x)dx = \begin{cases} 2\int_0^a f(x)dx, if\ f(x)\ is\ an\ even\ function \\ 0, if\ f(x)\ is\ an\ odd\ function \end{cases}$
72.	Assertion:$\int_0^{2\pi} cos^5 x\, dx = 2\int_0^{\pi} cos^5 x\, dx$ Reason: If $f(x)$ is a continuous function defined on $[-a, a]$, then $\int_{-a}^{a} f(x)dx = \begin{cases} 2\int_0^a f(x)dx, if\ f(x)\ is\ an\ even\ function \\ 0, if\ f(x)\ is\ an\ odd\ function \end{cases}$
73.	Assertion:$\int_0^{\pi} \frac{x}{1-\cos\alpha \sin x} dx = \frac{\pi}{2}\int_0^{\pi} \frac{1}{1-\sin\alpha \cos x} dx$ Reason: Let $f(x)$ be a continuous function of *x* defined on $[0, a]$ such that $f(a - x) = f(x)$. Then, $\int_0^a xf(x)dx = \frac{a}{2}\int_0^a f(x)dx$.
74.	Assertion:$\int_0^1 \frac{2x}{5x^2+1} dx = \frac{1}{6}\log 5$. Reason: $\int_a^b f(g(x))g'(x)dx = \int_{g(a)}^{g(b)} f(t)dt$, where $t = g(x)$..
75.	Assertion:$\int_0^2 \|x^2 + 2x - 3\|dx = 4$. Reason: $\int_0^2 \|x^2 + 2x - 3\|dx = \int_1^2 (x^2 + 2x - 3)dx - \int_0^1 (x^2 + 2x - 3)dx$.

ANSWERS

Q.NO.	ANS	Q.NO.	ANS	Q.NO.	ANS
1	c	26	d	51	c
2	a	27	a	52	a
3	a	28	a	53	d
4	d	29	d	54	a
5	c	30	a	55	d
6	a	31	a	56	b
7	b	32	a	57	a
8	c	33	a	58	c
9	d	34	c	59	d
10	a	35	c	60	a
11	a	36	a	61	a
12	a	37	d	62	a
13	d	38	a	63	a
14	a	39	b	64	d
15	b	40	b	65	c
16	b	41	a	66	a
17	d	42	b	67	c
18	a	43	b	68	d
19	d	44	b	69	a
20	b	45	b	70	a
21	a	46	a	71	a
22	b	47	c	72	b
23	c	48	b	73	d
24	b	49	a	74	d
25	a	50	a	75	a

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