Class 12 Maths Chapter 7

Integrals

Assertion and Reason Questions

Directions: Each of these questions contains two statements, Assertion and Reason. Each of these questions also has four alternative choices, only one of which is the correct answer. You have to select one of the codes (a), (b), (c) and (d) given below.

(a) Assertion is correct, Reason is correct; Reason is a correct explanation for assertion.

(b) Assertion is correct, Reason is correct; Reason is not a correct explanation for Assertion

(c) Assertion is correct, Reason is incorrect

(d) Assertion is incorrect, Reason is correct.

1. Assertion: $I = \int_0^{\frac{\pi}{2}} \sqrt{\tan\ x} dx = \frac{\pi}{\sqrt{2}}$

   Reason: $\tan\ x = t^2$ makes the integrand in I as a rational function.

2. Assertion: $\int_{-2}^{2} \log\left(\frac{1+x}{1-x}\right) dx = 0$.

   Reason: If f is an odd finction, then $\int_{-a}^{a} f(x)dx = 0$.

3. 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 $\int x^n dx = \frac{x^{n+1}}{n+1} + C, n \neq -1$.

4. 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.

5. 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.

6. 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.

7. Assertion: Derivative of a function at a point exists.

Reason: Integral of a function at a point where it is defined, exists.

8. Assertion: $\int [\sin(\log x) + \cos(\log x)]dx = x\sin(\log x) + C$

   Reason: $\frac{d}{dx}[x\sin(\log x)] = \sin(\log x) + \cos(\log x)$.

9. Assertion: The value of $\int_a^b f(t)dt$ and $\int_a^b f(u)du$ are equal

   Reason: The value of definite integral of a function over any particular interval depends on the function and the interval not on the variable of integration.

10. Assertion: $\int_0^{\pi} x\sin x\cos^2 x\,dx = \frac{\pi}{2}\int_0^{\pi} \sin x\cos^2 x\,dx$

    Reason: $\int_a^b xf(x)dx = \frac{a+b}{2}\int_a^b f(x)dx$

11. Assertion: The value of the integral $\int e^x[\tan x + \sec^2 x]dx$ is $e^x\tan x + C$

    Reason: The value of the integral $e^x\{f(x) + f'(x)\}dx$ is $e^x f(x) + C$.

Answers

1. (a)
2. (a)
3. (a)
4. (a)
5. (d)
6. (b)
7. (c)
8. (a)
9. (a)
10. (c)
11. (a)