EXERCISE – II MULTIPLE CORRECT (OBJECTIVE QUESTIONS)

1. If $I = \int_0^{2\pi} \sin^2 x\, dx$, then

(A) $I = 2\int_0^{\pi} \sin^2 x\, dx$ (B) $I = 4\int_0^{\pi/2} \sin^2 x\, dx$

(C) $I = \int_0^{2\pi} \cos^2 x\, dx$ (D) $I = 8\int_0^{\pi/4} \sin^2 x\, dx$

2. The value of integral $\int_0^{\pi} x f(\sin x)\, dx$ is

(A) $\frac{\pi}{2}\int_0^{\pi} f(\sin x)\, dx$ (B) $\pi\int_0^{\pi/2} f(\sin x)\, dx$

(C) 0 (D) None of these

3. $\int_0^{\infty} \frac{x}{(1+x)(1+x^2)}\, dx$

(A) $\frac{\pi}{4}$ (B) $\frac{\pi}{2}$

(C) is same as $\int_0^{\infty} \frac{dx}{(1+x)(1+x^2)}$ (D) cannot be evaluated

4. The value of integral $\int_a^b \frac{|x|}{x}\, dx$, a < b is

(A) b – a if a > 0 (B) a – b if b < 0
(C) b + a if a < 0 < b (D) |b| – |a|

5. If $f(x) = \int_0^x (\cos^4 t + \sin^4 t)\, dt$, $f(x + \pi)$ will be equal to

(A) $f(x) + f(\pi)$ (B) $f(x) + 2(\pi)$

(C) $f(x) + f\left(\frac{\pi}{2}\right)$ (D) $f(x) + 2f\left(\frac{\pi}{2}\right)$

6. The value of $\int_0^1 \frac{2x^2+3x+3}{(x+1)(x^2+2x+2)}\, dx$ is

(A) $\frac{\pi}{4} + 2\,\ell n\, 2 - \tan^{-1} 2$ (B) $\frac{\pi}{4} + 2\,\ell n\, 2 - \tan\frac{1}{3}$

(C) $2\,\ell n\, 2 - \cot^{-1} 3$ (D) $-\frac{\pi}{4} + \ell n\, 4 + \cot^{-1} 2$

7. A function f(x) which satisfies, $f'(\sin^2 x) = \cos^2 x$ for all real x & f(1) = 1 is

(A) $f(x) = x - \frac{x^3}{3} + \frac{1}{3}$ (B) $f(x) = x^2 - \frac{x}{2} + \frac{1}{2}$

(C) a polynomial of degree two (D) f(0) = 1/2

8. If $I_n = \int_0^1 \frac{dx}{(1+x^2)^n}$; $n \in N$, then which of the following statements hold good ?

(A) $2n\, I_{n+1} = 2^{-n} + (2n-1)\, I_n$ (B) $I_2 = \frac{\pi}{8} + \frac{I}{4}$

(C) $I_2 = \frac{\pi}{8} - \frac{I}{4}$ (D) $I_3 = \frac{\pi}{16} - \frac{5}{48}$

9. If f(x) is integrable over [1, 2], then $\int_1^2 f(x)\, dx$ is equal to

(A) $\lim_{n\to\infty} \frac{1}{n}\sum_{r=1}^{n} f\left(\frac{r}{n}\right)$ (B) $\lim_{n\to\infty} \frac{1}{n}\sum_{r=n+1}^{2n} f\left(\frac{r}{n}\right)$

(C) $\lim_{n\to\infty} \frac{1}{n}\sum_{r=1}^{n} f\left(\frac{r+n}{n}\right)$ (D) $\lim_{n\to\infty} \frac{1}{n}\sum_{r=1}^{2n} f\left(\frac{r}{n}\right)$

10. If $f(x) = 2^{\{x\}}$, where {x} denotes the fractioal aprt of x. Then which of the following is true ?

(A) f is periodic (B) $\int_0^1 2^{\{x\}}\, dx = \frac{1}{\ell n\, 2}$

(C) $\int_0^1 2^{\{x\}}\, dx = \log_2 e$ (D) $\int_0^{100} 2^{\{x\}}\, dx = 100 \log_2 e$

11. If $f(x) = \int_0^x (2\cos^2 3t + 3\sin^2 3t)\, dt$, $f(x + \pi)$ is equal to

(A) $f(x) + f(\pi)$ (B) $f(x) + 2f\left(\frac{\pi}{2}\right)$

(C) $f(x) + 4f\left(\frac{\pi}{4}\right)$ (D) None of these