SUNDARBAN MAHAVIDYALAYA

Internal Assessment

SEMESTER-IV

Core Course - 8

Full Marks-20.

Time-

$2 \times 10 = 20$.

(*) Choose the Correct option of the following

1. $\int_0^\infty e^{-ax} x^{n-1}\, dx$ is equal to —

(a) $\Gamma(n)$ (b) $\frac{\Gamma(n)}{a^{n-1}}$ (c) $\frac{\Gamma(n)}{a^n}$ (d) $a^n \Gamma(n)$.

2. Let $f_n(x) = \tan^{-1} nx$, $x \in R$. Then $\lim_{n\to\infty} f_n(x)$ is —

(a) 0 (b) $\frac{\pi}{2}$ (c) $-\frac{\pi}{2}$ (d) $\frac{\pi}{2} \operatorname{sgn} x$.

3. The Radius of convergence of the power series $\sum_{n=0}^{\infty} 2^{2n} x^{n^2}$ is —

(a) $\frac{1}{4}$ (b) 1 (c) 2 (d) 4.

4. If $\{f_n\}_n$ converges uniformly on $[a, b]$ to f and $\lim_{x\to c} f_n(x) = a_n$ then —

(a) $\{a_n\}_n$ is Convergent (b) $\lim_{n\to\infty} a_n = f(c)$.

(c) $\lim_{n\to\infty} a_n = \lim_{x\to c} f(x)$ (d) both (a) and (c)

5. $B(\frac{1}{2}, \frac{1}{2})$ is —

(a) π (b) $\sqrt{\pi}$ (c) $\frac{2}{\sqrt{\pi}}$ (d) none of this.

6. $\int_0^\infty \frac{1}{1+x^2}\,dx$ is equal to —

(a) 1 (b) $\frac{\pi}{2}$ (c) $\frac{2}{\pi}$ (d) None of this.

7. Let f be non-negative continuous function on $[a, b]$ and $\int_a^b f = 0$. Then —

(a) $f(x) = 0 \ \forall x \in [a, b]$ (b) $f(x) = 0$ for some $x \in [a, b]$

(c) $f(x) \neq 0 \ \forall x \in [a, b]$ (d) $f(x) \geq 0 \ \forall x \in [a, b]$

8. Let $f : [a, b] \to \mathbb{R}$ be integrable on $[a, b]$ and $\varphi'(x) = f(x) \ \forall x \in [a, b]$. Then —.

(a) $\int_a^b f = \varphi(b) - \varphi(a)$. (b) $\int_a^b f = \varphi(a) - \varphi(b)$.

(c) $\int_a^b \varphi = f(a) - f(b)$ (d) $\int_a^b \varphi = f(b) - f(a)$

9. Let $\lim_{n \to \infty} x e^{-nx} = f(x)$, $x \geq 0$. Then —

(a) $f(x) = 0$, $x \geq 0$, (b) $f(x) \geq 1$, $x \geq 0$ (c) $f(x) = e^x$, $x > 1$.

(d) None of this.

10. $\int_0^\infty \frac{\sin x}{x}\,dx$ is equal to

(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{2}$ (c) π (d) 0.