B.Sc. III (B-326) Analysis

Objective Question on Riemann Integral

Q.1 The maximum of the length of the partition is called
(a) norm (b) length (c) range (d) none of these

Q.2. If P_1 and P_2 be two partitions of $[a,b]$ such that $P_1 \subseteq P_2$ then
(a) $U(P_1,f) \geq L(P_2,f)$ (b) $U(P_1,f) \leq L(P_2,f)$
(c) $U(P_1,f) = L(P_2,f)$ (d) None of these

Q.3. $L(P, f+g) \geq$
(a) $L(P,f) + L(P,g)$ (b) $L^2(P,f) + L^2(P,g)$
(c) $U(P,f) + U(P,g)$ (d) None of these

Q.4. The necessary and sufficient condition for R-integrability is
(a) $U(P,f) - L(P,f) < \epsilon$ (b) $U(P,f) - L(P,f) > \epsilon$
(c) $U(P,f) + L(P,f) > 0$ (d) $U(P,f) + L(P,f) < 0$

Q.5 $f : [0,1] \to R$ such that
$$f(x) = \begin{cases} 0 & \text{if } x \text{ is rational} \\ 1 & \text{if } x \text{ is irrational} \end{cases}$$, then
(a) f is R-integrable (b) f is not R-integrable
(c) $L(P,f)$; $U(P,f)$ do not exist (d) none of these

Q.6. The value of $\lim_{\|P\| \to 0} L(P,f) =$
(a) $\int_a^b f\,dx$ (b) $\int_{\bar{a}}^{b} f\,dx$ (c) $\int_a^{\bar{b}} f\,dx$ (d) none of these

Q.7 If f is a bounded and R-integrable over $[a,b]$ and M, m are bounds of f on $[a,b]$ then
(a) $m(b-a) \leq \int_a^b f\,dx \leq M(b-a)$ if $b \geq a$
(b) $m(b-a) \geq \int_a^b f\,dx \geq M(b-a)$ if $a \geq b$
(c) both (a) and (b) (d) none of these

Q.8 For function $f(x) = x$ in the interval $[0,3]$, Let $P = \{0,1,2,3\}$ be a partition of $[0,3]$ then the value of $L(P,f)$ is
(a) 0 (b) 1 (c) 2 (d) 3

Q.9. If $f(x) = \sin x$ $\forall x \in [0, \pi/2]$ then f is
(a) R-integrable on $[0,\pi/2]$ (b) not R-integrable on $[0,\pi/2]$
(c) both (a) and (b) (d) none of these

Q.10. If $f \in R[a,b]$ and $g \in R[a,b]$ then:
(a) $f+g \in R[a,b]$ (b) $fg \in R[a,b]$
(c) both (a) and (b) (d) (a) is true (b) is false

Q.11. If f be a continuous function on $[a,b]$ and ϕ be a differentiable function on $[a,b]$, such that $\phi'(x) = f(x)$ $\forall x \in [a,b]$, then
(a) $\int_a^b f(x)\,dx = \phi(a) + \phi(b)$ (b) $\int_a^b f(x)\,dx = \phi(b) - \phi(a)$
(c) $\int_a^b f(x)\,dx = \phi(a) - \phi(b)$ (d) none of these