TELANGANA UNIVERSITY
S.S.R. DEGREE COLLEGE, NIZAMABAD (C.C:5029)
III SEMESTER INTERNAL ASSESSMENT II EXAMINATIONS
MATHEMATICS (REAL ANALYSIS) QUESTION BANK

I. Multiple choice questions.

1. The derivative of function $g(x)=x^2$ is g'(x) = [d]
(a) x^2+1 (b) x (c) 0 (d) 2x

2. If $f(x)=x^n$ then f'(x) = [c]
(a) x^n-a^n (b) $x^{1/2}$ (d) nx^{n-1} (c) $n.x^n$

3. $\lim_{x\to a} x^k =$ [b]
(a) k (b) a^k (c) k^2 (d) a

4. If f and g are functions that are differentiable at point 'a' then (f+g)'(a) = [d]
(a) f'(a) g'(a) (b) f'(a) g(a) (c) f'(a)-g'(a) (d) f'(a)+ g'(a)

5. If $f(x)=\sin(x^3)$ then f'(x)= [a]
(a) $(3x^2)\cos(x^3)$ (b) $\cos(x^3)$ (c) $3\cos x^3$ (d) 3x cosx

6. The function e^x on R is [a]
(a) Strictly increasing (b) Strictly decreasing (c) Bounded (d) Continuous

7. The function cosx on [0, π] is [d]
(a) Increasing (b) Continuous (c) Differentiable (d) Strictly decreasing

8. If $f(y) = y^{1/n}$, n is even then domain of f is [b]
(a) (0,0) (b) [0, ∞) (c) (0,00) (d) (-1,0)

9. $\lim_{x\to 0^+} \log x =$ [a]
(a) $-\infty$ (b) 0 (c) 1 (d) None

10. The limit $\lim_{x\to\infty}\left[1-\frac{1}{x}\right]^x$ is indeterminate of the form [c]
(a) 0° (b) ∞^0 (c) 1^∞ (d) $\frac{0}{0}$

11. The necessary and sufficient condition for Riemann integrability of bounded function f on [a, b] with a partition p. for every $\varepsilon > 0$ is, [a]
(a) $0 \le U(P,f)-L(P,f) < \varepsilon$ (b) $0 \le U(P,f)-L(P,f) > \varepsilon$
(c) $U(P,f)-L(P,f) = \varepsilon$ (d) None of these

12. Let f is a bounded function defined on a bounded interval [a, b], then corresponding to any partition P of [a, b] [a]
(a) L(f,P) ≤ U(f,P) (b) L(f, P) U(f. P) (c) Both (a) and (b) (d) Neither (a) nor (b)

13. Let f be a bounded function defined on [a, b] and P be the partition on [a, b] and Q is refinement of P. then [a]
(a) L(Q,f) ≥ L(P,f) (b) L(Q,f)≤L(P,f) (c) U(Q, f) ≥ U(P, f) (d) None of these

14. Let f be a bounded function on [a, b] and p be the partition of [a, b] and Q is refinement of p then, [b]
(a) L(Q,f) ≤ L(P,f) (b) U(Q, f) ≤ U(P, f) (c) U(Q, f) ≥ u(P, f) (d) None of these

15. If f is Riemann integrable on [a, b], then [d]
(a) $\left|\int_a^b f(x)dx\right| = \int_a^b |f(x)|dx$ (b) $\left|\int_a^b f(x)dx\right| \ge \int_a^b |f(x)|dx$
(c) $\left|\int_a^b f(x)dx\right| \ne \int_a^b |f(x)|dx$ (d) $\left|\int_a^b f(x)dx\right| \le \int_a^b |f(x)|dx$

16. Let f be a bounded function defined on [a, b], then f' is Riemann integrable if and only if [c]
(a) $\underline{\int_a^b} f \le \overline{\int_a^b} f$ (b) $\underline{\int_a^b} f \ge \overline{\int_a^b} f$ (c) $\underline{\int_a^b} f = \overline{\int_a^b} f$ (d) $\overline{\int_a^b} f = -\underline{\int_a^b} f$

17. Let f, g be bounded functions on [a, b] and let P be partition on [a, b], then, [a]

(a) U(P, f+g) $\leq$U(P, f)+u(P, g) (b) U(P, f+g) $\geq$ U(P, f)+U(P, g)

(c) U(P, f+g) = U(P, f)+U(P, g) (d) L(P, f+g) $\leq$ L(P, f)+L(P, g)

18. Let f be a continuous function on [a, b] and f be a differentiable function on [a, b] such that $\phi(x) = f(x) \forall X \in [a,b]$ then [b]

(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

19. If f be a bounded function on [a, b] and if P, Q are partitions of [a, b], P $\subseteq$ Q then [a]

(a) L(f, P) $\leq$ L(f, Q) $\leq$ U(f, Q) $\leq$ U(f, P) (b) L(f, P) $\geq$L(f, Q) $\leq$ U(f, Q) $\geq$ U(f, P)

(c) L(f, P) $\leq$ L(f, Q) $\geq$U(f, Q) $\geq$ U(f, P) (d) L(f, P) $\geq$L(f, Q) $\geq$U(f, Q) $\geq$U(f, P)

20. If f and [f] are integrable on [a, b], then [b]

(a) $\left|\int_a^b f\right| \geq \int_a^b (f)$ (b) $\left|\int_a^b f\right| \leq \int_a^b |f|$ (c) $\left|\int_a^b f\right| = \int_a^b |f|$ (d) None of these

II. Fill in the Blanks

1. The domain of 'f' is the set of points at which f is differentiable.
2. If f is differentiable at a point a, then f is continuous at 'a'.
3. If f and g are functions that are differentiable at the point 'a' then (cf)'(a)= c.f'(a)
4. If x_0 and y_0 are both end point of [a, b], then f is a function.
5. If f is a differentiable function on an interval (a,b) then f is strictly increasing if f'(x) > 0
6. The form of $R_n(x) = \frac{(x-y)^{n-1}}{(n-1)!} f^{(n)}(y).x$ is known as cauchy's form of remainder
7. The derivative of f(x)=x+2 at x-a is 1
8. If f(x)= sinx and g(x) = $\frac{1}{2}$ then composite function (fog)x = $\sin\frac{1}{x}$
9. $\lim_{n\to\infty}\left[1-\frac{1}{n}\right]^n = e^{-1}$
10. The limit $\lim_{n\to 0^+} X^x$ is of the indeterminate form 0^0
11. If P and Q are two partitions of a closed and bounded interval [a, b], then Q is called refinement of P If $Q \supset P$
12. If P_1 and P_2 be two partitions on [a, b] and $P=P_1UP_2$, then p is called common refinement of P_1 and P_2
13. Let f be a real valued bounded function defined on [a, b] and f is called Riemann integrable on [a, b] If $\int_a^b f = \int_a^b f$
14. The lower Riemann integral of f over [a, b] is supremum of L(P, f) over all partitions, P$\in$ [a, b].

15. If f: [a,b] $\rightarrow$R is a bounded function, then L(P,-f) = -U(P,f)

16. The upper Riemann integral of f over [a, b] is the infimum of U(P, f) over all partitions P$\in$ [a, b].

17. Let f be a real valued bounded function on [a, b] then, the lower Riemann integral of f cannot exceed the upper Riemann integral of f over [a,b]

18. A function F(x), whose derivative F'(x) = f(x) is called an anti-derivative of f(x).

19. Let f be continuous on [a, b] and F(x)= $\int_a^x f(t)dt \forall x \in [a,b]$ then F'(x)=<u>f(x)</u> $\forall x \in [a,b]$

20. Let f be Riemann integrable on [a, b] and ϕ be a differentiable function on [a, b] such that ϕ'(x) = f(x) $\forall x \in [a,b]$, then $\int_a^b f(x)dx =$ <u>(b)-(a)</u>