Examination October 2020

B.Sc. T.Y (Sem-VI)

2025 Mathematics MAT-601 Real Analysis-II

Time: One Hour **Max. Marks: 25**

Instructions
Solve any 25 questions from Q.1 to Q.30

1 In a metric space (M,ρ) for all $X,Y,Z \varepsilon M$, the triangle inequality is
(A) $\rho(x,y) \leqslant \rho(x,z)+\rho(z,y)$ (B) $\rho(x,y) \geqslant \rho(x,z)+\rho(z,y)$ (C) $\rho(x,y) \leqslant \rho(x,z)-\rho(z,y)$ (D)None of these

2 The metric defined by and $\rho: R\times R \rightarrow (0,\infty)$ defined b $\rho(x,x)=0, x \varepsilon M$ and $\rho(x,y)=1$ for $x,y \varepsilon R\, x \neq y$ then the metric ρ is called …..
(A)Indiscrete metric (B)Discrete metric (C)Usual metric (D)None of these

3 In a metric space M,ρ , the condition $\rho(x,y) \geqslant 0$,for $x,y \varepsilon M$ is called
(A)Negativity (B)Non-negativity (C)Symmetry (D)None of these

4 In the discrete metric space (R,d) the open ball B[x ;1] = …..
(A){x} (B)X (C)ϕ (D)R

5 Finite intersection of open sets in the metric space (M,ρ) is...
(A)Closed set (B)M (C)Open set (D)ϕ

6 In a metric space (M,ρ) , the subset E of M is closed if .….
(A) $E \subset \bar{E}$ (B) $E \supset \bar{E}$ (C) $E = \phi$ (D) $E = \bar{E}$

7 If is the closed interval [0,1], with the absolute value metric, then the open ball B[¼ ;½] is .….
(A)(-¼,¾) (B)[0, ¾] (C)(0, ¾) (D)(¼, ½)

8 In a metric space, arbitrary intersection of closed sets is …..
(A)Open set (B)Closed set (C)Empty set (D)None of these

9 In a metric space (M,ρ) , the set and the empty set ϕ both are …
(A)Open and Closed sets (B)Closed sets (C)Open set (D)None of these

10 Let G be an open subset of the metric space M, then the complement of G i.e. G' = M - G is .....
(A)Open set (B)Closed set (C)Open and Closed set (D)None of these

11 If f and g are continuous functions from a metric space M_1 into metric space M_2 , then the function f+g is …..
(A)Uniformly discontinuous (B)Discontinuous (C)Continuous (D)None of these

12 The metric space R with usual metric is …
(A)Disconnected (B)Compact (C)Connected (D)None of these

13 Every continuous function defined on a compact metric space is …
(A)Uniformly continuous (B)Discontinuous (C)Not uniformly continuous (D)None of these

14 In R, a real valued continuous function on a closed bounded interval is …
(A)Unbounded (B)Bounded (C)Continuous (D)None of these

15 The subset A of metric space (M,ρ) is not bounded, then …
(A)Diam A = $-\infty$ (B)Diam A = 0 (C)Diam A = 1 (D)Diam A = ∞

16 Every finite subset of a metric space M is …
(A)Bounded above (B)Totally bounded (C)Not bounded (D)None of these

17 In the metric space M, every Cauchy sequence of points in M converges to a points in M, then the metric space M is called .….
(A)Complete Metric Space (B)Compact Metric Space (C)Connected Metric Space (D)None of these

18 If M is a closed subset of the compact metric space (M,p) , then the metric space (A,p) is...
(A)Compact (B)Complete (C)Connected (D)None of these

19 A metric space M is Compact, if it is …

(A) Complete (B) Compact (C) Complete and totally bounded (D) Totally bounded

20 The set of all irrational numbers is …

(A) Of measure zero (B) Not of measure zero (C) Finite set (D) None of these

21 For Riemann integrability, condition of continuity is …..

(A) Necessary (B) Sufficient (C) Necessary and sufficient (D) None of these

22 If the functions f and g are integrable on [a, b] and $f(x) \leqslant g(x)$ for $x \varepsilon [a,b]$, then …..

(A) $\int_a^b f(x) \leqslant \int_a^b g(x)$ (B) $\int_a^b f(x) \geqslant \int_a^b g(x)$ (C) $\int_a^b f(x) = \int_a^b g(x)$ (D) None of these

23 If $f(x) = x (0 \leqslant x \leqslant 1)$ let σ ={0, 1/3 , 2/3 , 1} be the subdivision of [0, 1], then $U[f;\sigma]=0$ …..

(A) 0 (B) 1/3 (C) 2/3 (D) 1

24 Any constant function on a closed bounded interval [a, b] is …..

(A) Riemann integrable (B) Not Riemann integrable (C) Not integrable (D) None of these

25 If f is a bounded function on the closed bounded interval [a, b], if σ is any subdivision of [a, b] , then $\int_a^{-b} f(x)dx =$

(A) $g.l.b. U[f;\sigma]$ (B) $g.l.b. L[f;\sigma]$ (C) $l.l.b. U[f;\sigma]$ (D) $l.l.b. L[f;\sigma]$

26 If the function f is Riemann integrable function over the [a, b] , then …

(A) $|\int_a^b f| \leqslant \int_b^a |f|$ (B) $|\int_a^b f| \geqslant \int_a^b |f|$ (C) $|\int_a^b f| \leqslant \int_a^b |f|$ (D) None of these

27 If $f \varepsilon R[a,b]$ and λ is any real number, then the function λf is …..

(A) Not integrable (B) Riemann integrable (C) Not Riemann integrable (D) None of these

28 If f(x) is Riemann integrable in every interval and is periodic with period 2π, then $\int_{-\pi}^{\pi} f(x)dx =$ ……

(A) $\int_0^{\pi} f(a+x)dx$ (B) $\int_{-\pi}^{\pi} f(a+x)dx$ (C) $\int_{-\pi}^{\pi} f(a-x)dx$ (D) None of these

29 A function f is said to be odd function if ......

(A) f(-x)=f(x) (B) f(x)=-f(-x) (C) f(-x)= -f(x) (D) None of these

30 $\int_{-\pi}^{\pi} \sin mx . \cos nx \, dx =$ ….. for m,n = 0,1,2,3.....

(A) 1 (B) π (C) -π (D) 0