Examination October 2020

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

2165 Mathematics MAT - 501 Real Analysis - I

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

Instructions :

Solve any 25 questions from Q 1 to Q 30

1 If f : A ➜ B and if X ⊂ A , Y ⊂ A then f (X ∪ Y) = -----

(A)f (X) ∪f (Y) (B)f (X ∩ Y) (C)f (X) ∩f (Y) (D)None of these

2 If f (x) = log x (0<x<∞) then the range of f(x) = ------

(A)0<x<∞ (B)0 (C)0 ≤x<∞ (D)0 ≤x≤∞

3 If A and B are subsets of X then $x_{A\cap B}$ = _______

(A)Max (x_A, x_B) (B)Min (x_A, x_B) (C)1 (D)0

4 The set of all algebraic number is -----

(A)countable (B)uncountable (C)both countable and uncountable (D)neither countable nor uncountable

5 If A = { 5,6,7,8} then the upper bound for A is ------

(A)every x ≥ 5 (B)8 (C)every x ≥ 8 (D)every x ≤ 8

6 If A = [0, 1] and B = [1, 2]. Let f (x) = log x then $f^{-1}(A\cap B)$ = ----

(A)[0, 2] (B)[1, e^2] (C)[1, e] (D)none of these

7 If A is nonempty subset of r that is bounded below then A has a greatest lower bound in R”. This axiom is called ------

(A)least upper bound axiom (B)greatest lower bound axiom (C)bounded axiom (D)none of these

8 If $\{S\_n\}_{n=1}^{\infty}$ is a sequence of non-negative numbers and if $\lim_{n\to\infty}$ S_n = L then ________

(A)L < 0 (B)L = 0 (C)L ≥ 0 (D)None of these

9 A nonincreasing sequence which is not bounded below is ------

(A)convergent (B)diverges to infinity (C)neither convergent nor divergent (D)diverges to minus infinity

10 If $\{s\_n\}_{n=1}^{\infty}$ is a Cauchy sequence of real numbers then $\{s\_n\}_{n=1}^{\infty}$ is -------

(A)convergent (B)divergent (C)not bounded (D)none of these

11 $\lim_{n\to\infty} \left(1+\frac{2}{n}\right)^n$ is______

(A)e (B) $\frac{1}{e}$ (C)1 (D) e^2

12 Every bounded sequence -----

(A)is convergent (B)is oscillatory (C)has a convergent subsequence (D)none of these

13 The sequence $\{(-1)^n\}_{n=1}^{\infty}$ is -----

(A)convergent (B)not bounded (C)bounded (D)none of these

14 If sn = { 1, -1 1, -2, 1, -3, ...}, then $\lim_{n\to\infty}$ inf s_n = ______

(A) $-\infty$ (B)- 1 (C)1 (D) ∞

15 $\lim_{n\to\infty} \frac{2n^3+5n}{4n^3+n^2}$ =_________

(A)1 (B)2 (C)1/2 (D)4

16 If $\{|s_n|\}_{n=1}^{\infty}$ converges to $|L|$, if $\{s_n\}_{n=1}^{\infty}$ converges to_____

(A)0 (B)L (C)1 (D) ∞

17 If $s_1=1, s_2=1$, and $s_{n+1}=s_n+s_{n-1}$ then the value of s_5 = ________

(A)2 (B)3 (C)8 (D)5

18 If $\sum_{n=1}^{\infty} a_n$ is a convergent series then $\lim_{n\to\infty} a_n$ = _________

(A)1 (B)0 (C)L (D) ∞

19 The $\sum_{n=1}^{\infty}\frac{1}{n}$ is ________

(A)convergent (B)bounded (C)divergent (D)not bounded

20 If $x \geqslant 1$, then the series $\sum_{n=0}^{\infty} x^n$ is_____

(A)Converges (B)diverges (C)Diverges to 1 - x (D)Converges to $\frac{1}{1-x}$

21 If $\{a_n\}_{n=1}^{\infty}$ is a non increasing sequence of positive numbers and $\lim_{n\to\infty} a_n=0$ then the series $\sum_{n=1}^{\infty}(-1)^{n+1}a_n$ is_______

(A)Convergent (B)Divergent (C)Both (a) and (b) (D)Conditionally convergent

22 The partial sum of the series 1 – 1 + 1 – 1 + … + $(-1)^{n+1}$ + …, when n is odd , is____

(A)1 (B)0 (C)-1 (D)n

23 $\sum_{n=1}^{\infty} a_n$ Converges conditionally if______

(A) $\sum_{n=1}^{\infty} a_n$ Converges

(B) $\sum_{n=1}^{\infty} |a_n|$ Converges but $\sum_{n=1}^{\infty} a_n$ diverges

(C) $\sum_{n=1}^{\infty} a_n$ diverges

(D) $\sum_{n=1}^{\infty} a_n$ Converges to A and $\sum_{n=1}^{\infty} |a_n|$ diverges

24 If $\sum_{n=1}^{\infty} a_n$ converges to A and $\sum_{n=1}^{\infty} b_n$ converges to B then $\sum_{n=1}^{\infty} (a_n - b_n)$ converges to______

(A)A (B)B (C)A + B (D)A - B

25 If u = x + y and v = x – y then the value of J (u, v) = _______

(A)0 (B)-2 (C)2 (D)1

26 The value of $\frac{\partial(y_1, y_2, .., y_n)}{\partial(x_1, x_2, .., x_n)} \times \frac{\partial(x_1, x_2, .., x_n)}{\partial(y_1, y_2, .., y_n)}$

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

27 If $u_1, \ldots u_2 \ldots, u_n$ are functions of n independent variables $x_1, x_2, \ldots x_n$ and if $F(u_1, u_2 \ldots, u_n)$ = othen $\frac{\partial(u_1, u_2, \ldots, u_n)}{\partial(x_1, x_2, \ldots, x_n)}$ = ________

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

28 If x = r cos θ and y = r sin θ then $\frac{\partial(x, y)}{\partial(r, \theta)}$ = ________

(A)0 (B)1 (C)r (D) θ

29 If $u_1, u_2 \ldots, u_n$ are functions of n variables $x_1, x_2 \ldots, x_n$ is denoted by_____

(A)J $(x_1, x_2 \ldots, x_n)$

(B)J $(u_1, u_2 \ldots, u_n)$

(C) $\frac{\partial(x_1, x_2, \ldots, x_n)}{\partial(u_1, u_2, \ldots, u_n)}$

(D)Non of these

30 If $y_1 = 1 - x_1, y_2 = x_1(1 - x_2), y_3 = x_1 x_2(1 - x_3)$. Then Jacobian of y_1, y_2, y_3 = ______

(A) $-x_1^2 x_2$ (B) $x_1^2 x_2$ (C) $-x_2^2 x_1$ (D) $x_2^2 x_1$