SRM Institute of Science and Technology

Ramapuram campus

Department of Mathematics

18MAB101T – Calculus and Linear Algebra

Year/Sem: I/I **Part – A** **Branch: Common to All**

Unit – V

Sequence and Series

1.	A sequence $\{a_n\}$ is said to be convergent if		**1 Mark**
	(a) $\lim_{n\to\infty} a_n = finite$ (b) $\lim_{n\to\infty} a_n = \infty$ (c) $\lim_{n\to\infty} a_n = -\infty$ (d) $\lim_{n\to\infty} a_n = infinite$	Ans (a)	**(CLO 5, Remember)**
2.	The sequence $\left\{(-1)^n\right\}$ is		**1 Mark**
	(a) oscillatory (b) monotonic (c) divergent to $-\infty$ (d) divergent to $+\infty$	Ans (a)	**(CLO 5, Remember)**
3.	A sequence which is monotonic and bounded is		**1 Mark**
	(a) conditionally convergent (b) absolutely convergent (c) convergent (d) divergent	Ans (c)	**(CLO 5, Remember)**
4.	The necessary condition for the convergence of $\sum u_n$ is		**1 Mark**
	(a) $\lim_{n\to\infty} u_n = 0$ (b) $\lim_{n\to\infty} u_n = \infty$ (c) $\lim_{n\to\infty} u_n = -\infty$ (d) $\lim_{n\to\infty} u_n \neq 0$	Ans (a)	**(CLO 5, Remember)**
5.	If $\{a_n\}$ and $\{b_n\}$ are two convergent sequences, then $\{a_n + b_n\}$ is		**1 Mark**
	(a) convergent (b) divergent (c) oscillatory (d) neither convergent nor divergent	Ans (a)	**(CLO 5, Remember)**
6.	The geometric series $1 + x + x^2 + x^3 + \cdots$ converges if		**1 Mark**
	(a) $-1 < x < 1$ (b) $x < 1$ (c) $x > 1$ (d) $x \geq 1$	Ans (a)	**(CLO 5, Remember)**
7.	The series $\frac{1}{1^p} + \frac{1}{2^p} + \frac{1}{3^p} + \cdots$ converges if		**1 Mark**
	(a) $p > 0$ (b) $p < 1$ (c) $p > 1$ (d) $p \leq 1$	Ans (c)	**(CLO 5, Remember)**

8.	The series $\frac{1}{1^p}+\frac{1}{2^p}+\frac{1}{3^p}+\cdots$ diverges if	**1 Mark**	
	(a) $p>0$ (b) $p<1$ (c) $p>1$ (d) $p\leq 1$	Ans (d)	**(CLO 5, Remember)**
9.	If $\sum u_n$ is a convergent series, then $\lim_{n\to\infty} u_n =$	**1 Mark**	
	(a) 1 (b) ± 1 (c) 0 (d) ∞	Ans (c)	**(CLO 5, Remember)**
10.	According to D' Alembert's ratio test, if $\sum u_n$ is a series of positive terms and $\lim_{n\to\infty}\frac{u_{n+1}}{u_n}=l$, then $\sum u_n$ converges if	**1 Mark**	
	(a) $l<1$ (b) $l>1$ (c) $l=1$ (d) $-1<l<1$	Ans (a)	**(CLO 5, Remember)**
11.	By Cauchy's root test, if $\sum u_n$ is a series of positive terms and $\lim_{n\to\infty}(u_n)^{\frac{1}{n}}=l$, then $\sum u_n$ converges if	**1 Mark**	
	(a) $l<1$ (b) $l>1$ (c) $l=1$ (d) $-1<l<1$	Ans (a)	**(CLO 5, Remember)**
12.	By Raabe's test, if $\lim\limits_{n\to\infty} n\left(\frac{u_n}{u_{n+1}}-1\right)=k$, then $\sum u_n$ diverges if	**1 Mark**	
	(a) $k<1$ (b) $k>1$ (c) $k=1$ (d) $-1<k<1$	Ans (a)	**(CLO 5, Remember)**
13.	By Logarithmic test, if $\lim\limits_{n\to\infty} n\log\frac{u_n}{u_{n+1}}=l$, then $\sum u_n$ converges if	**1 Mark**	
	(a) $l<1$ (b) $l>1$ (c) $l=1$ (d) $-1<l<1$	Ans (b)	**(CLO 5, Remember)**
14.	The series $\sum u_n$ containing positive and negative terms is __________, if $\sum\|u_n\|$ is divergent but $\sum u_n$ is convergent.	**1 Mark**	
	(a) divergent (b) oscillating finitely (c) oscillating infinitely (d) conditionally convergent	Ans (d)	**(CLO 5, Remember)**
15.	The series $\sum u_n$ containing positive and negative terms is absolutely convergent, if $\sum\|u_n\|$ is	**1 Mark**	
	(a) convergent (b) divergent to $-\infty$ (c) divergent to $+\infty$ (d) oscillatory	Ans (a)	**(CLO 5, Remember)**

16.	Every absolutely convergent series is necessarily	**1 Mark**	
	(a) divergent (b) convergent (c) oscillatory (d) conditionally convergent	Ans (b)	**(CLO 5, Remember)**
17.	The series $\sum_{n=1}^{\infty} \frac{1}{n^p}$ is convergent if	**1 Mark**	
	(a) $p = 0$ (b) $p = 1$ (c) $p > 1$ (d) $p < 1$	Ans (c)	**(CLO 5, Remember)**
18.	As per D' Alembert's ratio test, if $\sum u_n$ is a series of positive terms and $\lim_{n\to\infty} \frac{u_{n+1}}{u_n} = l$, then the series is divergent if	**1 Mark**	
	(a) $l = 0$ (b) $l = 1$ (c) $l > 1$ (d) $l < 1$	Ans (c)	**(CLO 5, Remember)**
19.	A series of positive terms cannot ____________.	**1 Mark**	
	(a) oscillate (b) absolutely converge (c) converge (d) diverge	Ans (a)	**(CLO 5, Remember)**
20.	The series $1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \ldots$ is	**1 Mark**	
	(a) divergent (b) conditionally convergent (c) oscillatory (d) neither convergent nor divergent	Ans (b)	**(CLO 5, Apply)**
21.	The series $1 - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \ldots$ is	**1 Mark**	
	(a) divergent (b) absolutely convergent (c) oscillatory (d) neither convergent nor divergent	Ans (b)	**(CLO 5, Apply)**
22.	By Raabe's test, if $\lim_{n\to\infty} n\left(\frac{u_n}{u_{n+1}} - 1\right) = k$, then $\sum u_n$ converges if	**1 Mark**	
	(a) $k < 1$ (b) $k > 1$ (c) $k = 1$ (d) $-1 < k < 1$	Ans (b)	**(CLO 5, Remember)**

23.	By Cauchy's root test, if $\sum u_n$ is a series of positive terms and $\lim_{n\to\infty}(u_n)^{\frac{1}{n}} = l$, then $\sum u_n$ diverges if	**1 Mark**	
	(a) $l < 1$ (b) $l > 1$ (c) $l = 1$ (d) $-1 < l < 1$	Ans (b)	**(CLO 5, Remember)**
24.	By Logarithmic test, if $\lim\limits_{n\to\infty} n \log \frac{u_n}{u_{n+1}} = l$, then $\sum u_n$ diverges if	**1 Mark**	
	(a) $l < 1$ (b) $l > 1$ (c) $l = 1$ (d) $-1 < l < 1$	Ans (a)	**(CLO 5, Remember)**
25.	If $-1 < x < 1$, then the geometric series $1 + x + x^2 + x^3 + \cdots$ converges to	**1 Mark**	
	(a) $\frac{1}{1-x}$ (b) $\frac{1}{1+x}$ (c) e^x (d) $\frac{1}{x!}$	Ans (a)	**(CLO 5, Remember)**
26.	The geometric series $1 + x + x^2 + x^3 + \cdots$ oscillates finitely if	**1 Mark**	
	(a) $x = -1$ (b) $x < 1$ (c) $x > 1$ (d) $x \geq 1$	Ans (a)	**(CLO 5, Remember)**
27.	The geometric series $1 + x + x^2 + x^3 + \cdots$ oscillates infinitely if	**1 Mark**	
	(a) $x < -1$ (b) $x < 1$ (c) $x > 1$ (d) $x \geq 1$	Ans (a)	**(CLO 5, Remember)**
28.	If $\sum u_n$ is convergent, then $\sum k u_n$ (where k is constant) is	**1 Mark**	
	(a) convergent (b) divergent (c) oscillatory (d) neither convergent nor divergent	Ans (a)	**(CLO 5, Remember)**
29.	The series $1 - \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}} - \frac{1}{\sqrt{4}} + \cdots$ is	**1 Mark**	
	(a) divergent (b) neither convergent nor divergent (c) oscillatory (d) conditionally convergent	Ans (d)	**(CLO 5, Apply)**
30.	The convergence of the series $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \cdots$ is tested by	**1 Mark**	
	(a) Ratio test (b) Raabe's test (c) Leibnitz test (d) Cauchy Root test	Ans (c)	**(CLO 5, Remember)**

31.	A monotonic increasing sequence which is not bounded above is ______.	**1 Mark**	
	(a) oscillatory (b) convergent (c) divergent to – ∞ (d) divergent to + ∞	Ans (d)	**(CLO 5, Remember)**
32.	A monotonic decreasing sequence which is not bounded below is ______.	**1 Mark**	
	(a) oscillatory (b) convergent (c) divergent to – ∞ (d) divergent to + ∞	Ans (c)	**(CLO 5, Remember)**
33.	The series $\sum u_n$ of positive terms is convergent if	**1 Mark**	
	(a) $\lim\limits_{n\to\infty} \frac{u_{n+1}}{u_n} < 1$ (b) $\lim\limits_{n\to\infty} \frac{u_n}{u_{n+1}} = 1$ (c) $\lim\limits_{n\to\infty} \frac{u_n}{u_{n+1}} \le 1$ (d) $\lim\limits_{n\to\infty} \frac{u_{n+1}}{u_n} > 1$	Ans (a)	**(CLO 5, Remember)**
34.	The *n*th term of a series in Arithmetic Progression is	**1 Mark**	
	(a) $t_n = a-(n-1)d$ (b) $t_n = a+(n+1)d$ (c) $t_n = a-(n+1)d$ (d) $t_n = a+(n-1)d$	Ans (d)	**(CLO 5, Remember)**
35.	$\sum_1^\infty \frac{n^3}{3^n}$ is	**1 Mark**	
	(a) oscillatory (b) convergent (c) divergent to – ∞ (d) divergent to + ∞	Ans (b)	**(CLO 5, Apply)**
36.	The series $\sum \frac{1}{n} \sin\left(\frac{1}{n}\right)$ is	**1 Mark**	
	(a) oscillatory (b) convergent (c) divergent (d) conditionally convergent	Ans (b)	**(CLO 5, Apply)**
37.	If D'Alembert's ratio test fails, then use	**1 Mark**	
	(a) Comparison test (b) Leibnitz's test (c) Cauchy's integral test (d) Raabe's test	Ans (d)	**(CLO 5, Remember)**
38.	The series $\sum \frac{1}{n!}$ is	**1 Mark**	
	(a) oscillatory (b) convergent (c) divergent (d) conditionally convergent	Ans (b)	**(CLO 5, Apply)**