REMEMBER-----NOTA means None of the Above.

1. The sequence $\{r^n\}$ *converges if and only if*

a) $|r|<1$ *b)* $|r|\le 1$ *c)* $-1<r\le 1$
d) $0<r<1$ *e) NOTA*

2. If $\frac{1}{n(n+1)}=\frac{1}{n}-\frac{1}{n+1}(n\ge 1)$, *then* $\sum_{n=1}^{\infty}\frac{1}{n(n+1)}=$

a) $\frac{4}{3}$ *b) 1* *c)* $\frac{3}{2}$ *d)* $\frac{3}{4}$ *e) NOTA*

3. For which of the following series does the Ratio Test fail?

a) $\sum\frac{1}{n!}$ *b)* $\sum\frac{n}{2^n}$ *c)* $\sum\frac{n^n}{n!}$
d) $1+\frac{1}{2^{3/2}}+\frac{1}{3^{3/2}}+\frac{1}{4^{3/2}}+\ldots$ *e) NOTA*

4. $\sum_{n=1}^{\infty}\left(\frac{2}{3}\right)^n=$

a) 1 *b)* $\frac{3}{2}$ *c)* $\frac{4}{3}$ *d) 2* *e) NOTA*

5. The series $\sum_{n=0}^{\infty}n!(x-3)^n$ *converges if and only if*

a) $x=0$ *b)* $2<x<4$ *c)* $x=3$ *d)* $2\le x\le 4$
e) NOTA

6. The coefficient of $\left(x-\frac{\pi}{4}\right)^3$ *in the Taylor Series about* $\frac{\pi}{4}$ *of* $f(x)=\cos x$ *is*

a) $\frac{\sqrt{3}}{12}$ *b)* $\frac{-1}{12}$ *c)* $\frac{1}{12}$ *d)* $\frac{\sqrt{2}}{12}$ *e) NOTA*

7. If $e^{-0.1}$ *is computed using series, then, correct to 3 decimal places, it equals*

a) 0.905 *b) 0.903* *c) 0.904* *d) 0.900*
e) NOTA

8. The coefficient of $(x-1)^5$ *in the Taylor series for* $x\ln x$ *about* $x=1$ *is*

a) $\frac{-1}{20}$ *b)* $\frac{1}{5!}$ *c)* $\frac{-1}{5!}$ *d)* $\frac{1}{20}$ *e) NOTA*

9. The radius of convergence of the series $\sum_{n=1}^{\infty} \frac{x^n}{2^n} \cdot \frac{n^n}{n!}$ *is*

a) 0 *b)* 2 *c)* $\frac{2}{e}$ *d)* $\frac{e}{2}$ *e) NOTA*

10. The sum of the series $\sum_{n=1}^{\infty} \left(\frac{\pi^3}{3^\pi} \right)^n$ *is*

a) 0 *b)* 1 *c)* $\frac{3^\pi}{\pi^3 - 3^\pi}$ *d)* $\frac{\pi^3}{3^\pi - \pi^3}$
e) NOTA

11. When $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{3n-1}$ *is approximated by the sum of its first 300 terms, the error is closest to*

a) 0.001 *b)* 0.002 *c)* 0.003
d) 0.004 *e) NOTA*

12. The series
$(x-1) - \frac{(x-1)^2}{2!} + \frac{(x-1)^3}{3!} - \frac{(x-1)^4}{4!} + \ldots$ *converges*

a) only for $0 < x < 2$ *b) only for* $0 \le x < 2$
c) only for $0 < x \le 2$ *d) only if* $x = 1$ *e) NOTA*

13. The coefficient of x^3 *in the Maclaurin Series (about* $x = 0$*) of* $\ln(1-x)$ *is*

a) $\frac{-2}{3}$ *b)* $\frac{-1}{2}$ *c)* $\frac{-1}{3}$ *d)* $\frac{-1}{4}$ *e) NOTA*

14. $\lim_{n\to\infty} \frac{1+\sqrt{2}+\sqrt{3}+\ldots+\sqrt{n}}{n^{3/2}}$ *is equal to the definite integral*

a) $\int_0^1 \sqrt{x}\,dx$ *b)* $\int_0^1 \frac{1}{\sqrt{x}}\,dx$ *c)* $\int_1^2 \sqrt{x}\,dx$
d) $\int_0^1 \frac{1}{x}\,dx$ *e) NOTA*

15. By differentiating term by term the series $(x-1) - \frac{(x-1)^2}{4} + \frac{(x-1)^3}{9} - \frac{(x-1)^4}{16} + \ldots$ *the interval of convergence obtained is*

a) $0 \le x \le 2$ *b)* $0 \le x < 2$ *c)* $0 < x \le 2$
d) $0 < x < 2$ *e) NOTA*

16. Find the limit of the sequence $\left\{ \frac{-9+(-1)^n}{n!} \right\}$

a) -9 *b) 0* *c) 1*
d) The sequence diverges *e) NOTA*

17. Determine which of the following converge.

a) $\sum_{n=1}^{\infty}\frac{1}{n}$ *b)* $\sum_{n=0}^{\infty}3\left(\frac{4}{3}\right)^{n}$ *c)* $\sum_{n=1}^{\infty}\frac{1}{n^{0.3}}$

d) $\sum_{n=1}^{\infty}\frac{1}{n^{3/2}}$ *e) NOTA*

18. Determine which series diverges.

a) $\sum_{n=0}^{\infty}\frac{1}{2^{n}}$ *b)* $\sum_{n=0}^{\infty}(4+(-1)^{n})$

c) $\sum_{n=0}^{\infty}\left(\frac{1}{n}-\frac{1}{n+1}\right)$ *d)* $\sum_{n=1}^{\infty}\frac{1}{n^{2}}$ *e) NOTA*

19. Which test could be used to show that $\sum_{n=1}^{\infty}\frac{n}{8n^{3}+6n^{2}-7}$ *converges?*

a) Geometric Series Test b) p-Series Test
c) Integral Test d) Limit Comparison Test
e) NOTA

20. Determine the error when the sum of the series $\sum_{n=0}^{\infty}\frac{2}{5^{n}}$ *is approximated by its 1st 3 terms.*

a) 0.02 b) 0.2 c) 0.01 d) 0.1 e) NOTA

21. Determine how many terms are needed for the error to the sum of the series in the above problem (#20) to be less than 0.0002.

a) 3 b) 4 c) 5 d) 6 e) NOTA

22. Find the sum of the following series:

$$\frac{1}{\sqrt{2}+1}+\frac{1}{\sqrt{3}+\sqrt{2}}+\frac{1}{\sqrt{4}+\sqrt{3}}+\ldots+\frac{1}{\sqrt{25}+\sqrt{24}}$$

a) 1 b) 2 c) 3 d) 4 e) NOTA

23. Choose an equivalent series with the index of summation beginning at n = 0 for $\sum_{n=2}^{\infty}\frac{n2^{n}}{n-1}$.

a) $\sum_{n=0}^{\infty}\frac{n2^{n}}{n-1}$ *b)* $\sum_{n=0}^{\infty}\frac{(n-2)2^{n-2}}{n-3}$

c) $\sum_{n=0}^{\infty}\frac{(n+2)2^{n+2}}{n+1}$ *d)* $\sum_{n=0}^{\infty}\frac{(n+1)2^{n+1}}{n}$ *e) NOTA*

24. The nth term of a sequence is signified by t_n. *For all n > 1,* $t_1 + t_2 + t_3 + \ldots + t_n = n^2 t_n$ and $t_1 = \frac{1}{2}$. *Find the exact value of* $t_1 + t_2 + t_3 + \ldots + t_{50}$.

a) $\frac{49}{50}$ *b)* $\frac{50}{51}$ *c)* $\frac{51}{52}$ *d)* $\frac{52}{53}$ *e) NOTA*

25. Find the exact numerical value of

$$1 + 3\left(\frac{1}{3}\right) + 5\left(\frac{1}{3}\right)^2 + 7\left(\frac{1}{3}\right)^3 + 9\left(\frac{1}{3}\right)^4 + \ldots$$

a) e *b) 3* *c)* π *d) 5* *e) NOTA*

26. Evaluate: $\sum_{k=1}^{n+1}(2k-1) - \sum_{k=1}^{n}(2k-1)$

a) 2n *b) 2n + 1* *c) 2n – 1* *d) n* *e) NOTA*

27. Evaluate: $\sum_{i=1}^{\infty}\frac{i}{5^i}$

a) $\frac{1}{4}$ *b)* $\frac{5}{16}$ *c)* $\frac{1}{2}$ *d)* $\frac{3}{4}$ *e) NOTA*

28. Find the sum of the first 100 terms of the sequence: $\frac{2}{1\cdot 3}, \frac{2}{3\cdot 5}, \frac{2}{5\cdot 7}, \ldots, \frac{2}{(2n-1)(2n+1)}$

a) $\frac{198}{199}$ *b)* $\frac{199}{200}$ *c)* $\frac{200}{201}$ *d)* $\frac{201}{202}$ *e) NOTA*

29. Find the sum of the 1st 22 terms of the geometric progression having a 1st term of i, and ratio of (1 + i), where $i = \sqrt{-1}$. *Answer in the form c + di, where c and d are real numbers.*

a) $1 + 2048i$ *b)* $1 - 2048i$ *c)* $-1 + 2048i$
d) $-1 - 2048i$ *e) NOTA*

30. If $x_n^2 - x_{n-1}x_{n+1} = (-2)^n$ *for* $n \geq 1$, *and* $x_0 = x_1 = 1$, *then* $x_3 = ?$

a) 1 *b) –3* *c) 3* *d) 5* *e) NOTA*