9. $2+7+14+\ldots\ldots+(n^2+2n-1)=$

1) $\frac{n(2n^2+9n+1)}{6}$ 2) $\frac{2n^2+9n+1}{6}$

3) $\frac{2n^2+9n+1}{12}$ 4) $\frac{2n^2+9n+1}{24}$

10. $1+3+6+10+\ldots\ldots+\frac{(n-1)n}{2}+\frac{n(n+1)}{2}=$

1) $\frac{n(n+1)(n+2)}{3}$ 2) $\frac{(n+1)(n+2)}{6}$

3) $\frac{n(n+1)(n+2)}{6}$ 4) $\frac{(n+2)(n+1)^2}{3}$

11. $3.6+6.9+9.12+\ldots\ldots+3n(3n+3)=$

1) $\frac{n(n+1)(n+2)}{3}$

2) $3n(n+1)(n+2)$

3) $\frac{(n+1)(n+2)(n+3)}{3}$

4) $\frac{(n+1)(n+2)(n+4)}{4}$

12. $1.6+2.9+3.12+\ldots\ldots+n(3n+3)=$

1) $n(n+1)(n+2)$

2) $(n+1)(n+2)(n+3)$

3) $(n+2)(n+3)(n+4)$

4) $(n-1)n(n+1)$

13. $1^3+1^2+1+2^3+2^2+2+3^3+3^2+3+\ldots$ 3n terms =

1) $\frac{n(n+1)(n^2+12n+5)}{12}$

2) $\frac{n(n+1)(3n^2+7n+8)}{12}$

3) $\frac{n(n+1)(n+2)(n^2+5n+6)}{12}$

4) $\frac{(n+1)(n+2)(n+3)}{4}$

14. $\frac{1}{1.3}+\frac{1}{3.5}+\frac{1}{5.7}+\ldots\ldots$(n-3) terms

1) $\frac{n}{n+2}$ 2) $\frac{n+1}{n(n+3)}$

3) $\frac{n-3}{2n-3}$ 4) $\frac{n-1}{n(2n-3)}$

15. $1+3+7+15\ldots$ n terms =

1) $2^{n+1}-n-2$ 2) n^2+n-2

3) 2^n+n^2-2 4) n^2+2

16. $2.4+4.7+6.10+\ldots\ldots$(n-1) terms =

1) $2n^3-2n^2$ 2) $\frac{n^3+3n^2+1}{6}$

3) $2n^3+2n$ 4) $2n^3-n^2$

17. $1^2+3^2+5^2+\ldots\ldots$ upto n terms =

1) $\frac{n(2n-1)(2n+1)}{6}$

2) $\frac{n(2n-1)(2n+1)}{3}$

3) $\frac{n(n+1)(2n+1)}{12}$

4) $\frac{n(n+1)(2n-1)}{6}$

18. Sum to n terms of the series

$1+(1+x)+(1+x+x^2)+(1+x+x^2+x^3)+\ldots$

1) $\frac{n}{1-x}-\frac{x(1-x^n)}{(1-x)^2}$ 2) $\frac{n}{1-x}+\frac{x(1-x^n)}{(1-x)^2}$

3) $\frac{n}{1-x}+\frac{x(1+x^n)}{(1-x)^2}$ 4) $\frac{-n}{1-x}+\frac{x(1-x^n)}{(1-x)^2}$

19. If a,b and n are natural numbers then $a^{2n-1}+b^{2n-1}$ is divisible by

1) $a-b$ 2) a^3+b^3

3) $a+b$ 4) a^2+b^2

20. The number $a_n=6^n-5n$ for $n=1,2,3,\ldots\ldots$ when divided by 25 leave the remainder

1) 9 2) 7 3) 3 4) 1

S.P.Q. Student Practice Questions

21. $1+4+10+19+\ldots\ldots+\frac{3n^2-3n+2}{2}=$

1) $\frac{n^2(n^2+1)}{2}$ 2) $\frac{n(n^2+1)}{2}$

3) $\frac{n^2(n+1)}{2}$ 4) $\left\{\frac{n(n+1)}{2}\right\}^2$

22. $1.3+3.5+5.7+\ldots\ldots+(2n-1)(2n+1)=$

1) $\frac{n(4n^2+6n-1)}{3}$ 2) $\frac{n(3n^2+5n+1)}{3}$

3) $\frac{n(5n^2+7n-1)}{3}$ 4) $\frac{n(7n^2-5n+1)}{3}$

23. $1.4+2.5+\ldots\ldots+n(n+3)=$

1) $\frac{n(n+3)(n+5)}{9}$ 2) $\frac{n(n+1)(n+5)}{3}$

3) $\frac{n(n+5)(n+7)}{6}$ 4) $\frac{n(n+3)(n+9)}{12}$

24. $2+3+5+6+8+9+\ldots\ldots$ 2n terms =

1) $3n^2+2n$ 2) $4n^2+2n$

3) $4n^2$ 4) $5n^2+2n$

25. n^{th} term of the series $4+14+30+52+\ldots\ldots=$

1) $5n-1$ 2) $2n^2+2n$

3) $3n^2+n$ 4) $2n^2+2$

26. $2.3+3.4+4.5+\ldots\ldots$ n terms =

1) $\frac{n(n^2+6n+11)}{6}$ 2) $\frac{n(n^2+6n+14)}{9}$

3) $\frac{n(n^2+6n+11)}{3}$ 4) $\frac{n(n^2+6n+17)}{12}$

27. The nth term of the series $3+7+13+21+\ldots$ is

1) $4n-1$ 2) n^2+2n

3) n^2+n+1 4) n^2+2

28. The value of

$1.2.3+2.3.4+3.4.5+\ldots+n$ terms is

1) $\frac{n(n+1)(n+2)(n+3)}{12}$

2) $\frac{n(n+1)(n+2)(n+3)}{3}$

3) $\frac{n(n+1)(n+2)(n+3)}{4}$

4) $\frac{(n+2)(n+3)(n+4)}{6}$

29. $3.6+4.7+5.8+\ldots\ldots+$ (n-2) terms =

1) n^3+n^2+n+2

2) $\frac{2n^3+12n^2+10n-84}{6}$

3) $2n^3+12n^2+10n+84$

4) $2n^3-12n^2+10n-84$

30. $2+3.2+4.2^2+\ldots\ldots$ upto n terms =

1) $(n+1)2^{n-1}$ 2) $n\,2^{n+1}$

3) $n\,2^n$ 4) $(n+1)2^n$

31. If $1+5+12+22+35+\ldots\ldots+$ to n terms $=\frac{n^2(n+1)}{2}$ then n^{th} term of L.H.S is

1) $\frac{n(4n-1)}{3}$ 2) $\frac{n(3n-1)}{2}$

3) $\frac{n(3n+1)}{2}$ 4) $\frac{n(4n+1)}{3}$

32. $2.4+4.7+6.10+\ldots\ldots$ upto $(n-1)$ terms=

1) $2n^3+2n^2$

2) $\frac{1}{6}\left(n^3+3n^2+1\right)$

3) $2n^3+2n$ 4) $2n^3-2n^2$

44. Verification

EXERCISE-II

CRTQ & SPQ LEVEL-II

FINITE MATHEMATICAL INDUCTION, SUMMATION OF SERIES

C.R.T.Q Class Room Teaching Questions

1. If $2^3+4^3+6^3+.....+(2n)^3=Kn^2(n+1)^2$ then k =

1) 1/2 2) 1 3) 3/2 4) 2

2. If $a_k=\frac{1}{k(k+1)}$ for k = 1,2,3,... n, then $\left(\sum_{k=1}^{n}a_k\right)^2=$ 1) $\frac{n}{n+1}$ 2) $\frac{n^2}{(n+1)^2}$

3) $\frac{n^4}{(n+1)^4}$ 4) $\frac{n^6}{(n+1)^6}$

3. $\sum_{n=0}^{\infty}(-1)^n x^{n+1}=$

1) $\frac{x^n}{2(1+x)}$ 2) $\frac{x}{1+x}$ 3) $\frac{x}{x-1}$ 4) $\frac{x^n}{x-1}$

4. $\cos\theta+\cos 2\theta+\cos 3\theta+....+\cos\{(n-1)\theta\}+\cos n\theta=$

1) $\frac{\cos\left\{\frac{1}{2}(n+1)\theta\right\}.\sin\left(\frac{n\theta}{2}\right)}{\sin\left(\frac{\theta}{2}\right)}$

2) $\frac{\cos(n+1)\theta}{\sin\left(\frac{\theta}{2}\right)}$

3) $\frac{\cos\left(\frac{(n-1)\theta}{2}\right)\sin\left(\frac{n\theta}{2}\right)}{\sin\frac{\theta}{2}}$

4) $\frac{\sin\left(\frac{n\theta}{2}\right).\cos\{(n+1)\theta\}}{\sin\left(\frac{\theta}{2}\right)}$

5. If 'n' is a positive integer, then $n.1+(n-1).2+(n-2).3+...+1.n=$

1) $\frac{n(n+1)}{2}$ 2) $\frac{n(n+1)(n+2)}{6}$

3) $\frac{(n+1)(n+2)}{2}$ 4) $\frac{n(n+1)(2n+1)}{6}$

6. $1^2+(1^2+2^2)+(1^2+2^2+3^2)+....+$ n brackets =

1) $\frac{n(n+1)^2(n+2)^2}{12}$ 2) $\frac{n(n+1)^2(n+2)}{12}$

3) $\frac{n^2(n+1)(n+2)}{12}$ 4) $\frac{(n+1)}{2}$

7. $\frac{1}{2}.\frac{2}{2}+\frac{2}{2}.\frac{3}{2}+\frac{3}{2}.\frac{4}{2}+.....$ n terms

1) $\frac{n^2}{(n+1)^2}$ 2) $\frac{n^3}{(n+1)^3}$ 3) $\frac{n}{n+1}$ 4) $\frac{1}{n+1}$

8. If $t_n=\sum_{1}^{n}n$, then $t'_n=\sum_{1}^{n}t_n=$

1) $\frac{n(n+1)}{2}$ 2) $\frac{n(n+3)}{2}$

3) $\frac{n(n+1)(n+2)}{6}$ 4) $\frac{n(n+4)}{3}$

9. Let the statement $m^2>100$, the statement $P(k+1)$ will be true if

1) $P(1)$ is true 2) $P(2)$ is true

3) $P(k)$ is true 4) none of these

10. $1+\frac{1}{2}(1+2)+\frac{1}{3}(1+2+3)+\frac{1}{4}(1+2+3)+...$ upto 20 terms is

1) 110 2) 111 3) 115 4) 116

S.P.Q. Student Practice Questions

11. $4^3+5^3+6^3+.....+10^3=$

1) 1905 2) 2358

3) 2447 4) 2989

12. $\left(\sum n^3\right)\left(\sum n\right)=\left(\sum n^2\right)^2$ if

1) n = 3 2) n = 1

3) $n^2=3$ 4) n= -1

13. $\sum_{k=1}^{n} k\left(1+\frac{1}{n}\right)^{k-1} =$

1) $n(n-1)$ 2) $n(n+1)$

3) n^2 4) $(n+1)^2$

14. Sum of n^{th} bracket of (1) + (2+3+4)+(5+6+7+8+9) +..... is

1) $(n-1)^3+n^3$ 2) $(n-1)^3+8n^2$

3) $\frac{(n+1)(n+2)}{6}$ 4) $\frac{(n+3)(n+2)}{12}$

15. $\frac{1^2}{1}+\frac{1^2+2^2}{1+2}+\frac{1^2+2^2+3^2}{1+2+3}+.....+n$ terms =

1) $\frac{n(n+3)}{4}$ 2) $\frac{n(n+3)}{5}$

3) $\frac{n(n+2)}{3}$ 4) $\frac{n(n+5)}{6}$

16. $\sum_{k=1}^{5}\frac{1^3+2^3+.....+k^3}{1+3+5+.....+(2k-1)} =$

1) 22.5 2) 24.5 3) 28.5 4) 32.5

17. A = sum of first 10 natural numbers, B = sum of squares of first 10 natural numbers, C = sum of cubes of first 10 natural numbers, D = sum of first 10 even natural numbers, then increasing order of A,B,C,D

1) A,B,C,D 2) A,C,D,B

3) A,B,D,C 4) A,D,B,C

18. If $\sum_{r=1}^{n} t_r = \frac{1}{12}n(n+1)(n+2)$ then $\sum_{r=1}^{n}\frac{1}{t_r}$

1) $\frac{2n}{n+1}$ 2) $\frac{4n}{n+1}$ 3) $\frac{3n}{n+2}$ 4) $\frac{3n}{n+1}$

19. $1+(1+3)+(1+3+5)+...$ n brackets =

1) $\frac{n(n+1)(n+2)}{6}$

2) $\frac{n(n+1)(3n^2+23n+46)}{12}$

3) $\frac{n(27n^3+90n^2+45n-50)}{4}$

4) $\frac{n(n+1)(2n+1)}{6}$

20. $\frac{1}{1^3}+\frac{1+2}{1^3+2^3}+\frac{1+2+3}{1^3+2^3+3^3}+.....$ upto n terms =

1) $\frac{n}{n+1}$ 2) $\frac{n}{2(n+1)}$

3) $\frac{2n}{n+1}$ 4) $\frac{2}{n(n+1)}$

DIVISIBILITY

C.R.T.Q Class Room Teaching Questions

21. The greatest positive integer which divides $n(n+1)(n+2).....(n+r-1)$, $\forall n \in N$ is

1) $r!$ 2) $(r+1)!$

3) $n+r$ 4) $n-r+1$

22. If $10^n+3.4^n+x$ is divisible by 9 for all $n \in N$, then least positive value of 'x' is

1) 1 2) 5 3) 14 4) 23

S.P.Q. Student Practice Questions

23. $\forall n \varepsilon N, 5^{2n+2}-24n-25$ is divisible by

1) 576 2) 25 3) 24 4) 50

24. The remainder left out when $8^{2n}-(62)^{2n+1}$ is divided by 9 is

1) 2 2) 7 3) 8 4) 0

INEQUALITES

C.R.T.Q Class Room Teaching Questions

25. If $n>1$ then

1) $\frac{(2n)!}{(n!)^2}=\frac{4n}{2n+1}$

2) $\frac{(2n)!}{(n!)^2}<\frac{4n}{2n+1}$

3) $\frac{(2n)!}{(n!)^2}>\frac{4n}{2n+1}$ 4) none

$\Rightarrow 8^{2n}-(62)^{2n+1}=\left[(-1)^{2n}-(-1)^{2n+1}\right] \bmod 9$

$=(1+1) \bmod 9=2 \bmod 9 \Rightarrow$ Remainder $=2$

25. If $n=2$ then $\frac{(2n)!}{(n!)^2}=\frac{24}{4}=6, \frac{4n}{2n+1}=\frac{8}{3}$

$\Rightarrow \frac{(2n)!}{(n!)^2}>\frac{4n}{2n+1}$

26. $|\sin nx| \le 1 \le n|\sin x|$

27. If $n=1$ then, $\frac{(2n)!}{2^n(n!)^2}=\frac{2}{4}=\frac{1}{2}$,

$\frac{1}{\sqrt{3n+1}}=\frac{1}{\sqrt{4}}=\frac{1}{2}, \frac{1}{\sqrt{3n+2}}=\frac{1}{\sqrt{5}}$,

$\frac{1}{\sqrt{3n+4}}=\frac{1}{\sqrt{7}}$

$\frac{1}{\sqrt{3n+5}}=\frac{1}{\sqrt{8}}$,

$\therefore \frac{(2n)!}{2^{2n}(n!)^2} \le \frac{1}{\sqrt{3n+1}}$

28. If $n=2$ then $n!=2, \left(\frac{n+1}{2}\right)^n=\left(\frac{3}{2}\right)^3=\frac{9}{4}$

$\Rightarrow n!<\left(\frac{n+1}{2}\right)^n$

EXERCISE-III

CRTQ & SPQ LEVEL-III

SUMMATION OF SERIES

C.R.T.Q Class Room Teaching Questions

1. $\frac{1.2^2+2.3^2+3.4^2+....+n(n+1)^2}{1^2.2+2^2.3+3^2.4+....+n^2(n+1)}=$

1) $\frac{3n+1}{3n+5}$ 2) $\frac{3n+5}{3n+1}$

3) $(3n+1)(3n+5)$ 4) $\frac{3n+5}{3n+7}$

2. If $P(n)=1+2+3+.....+n$ is a perfect square N^2 and N is less than 100, then possible values of n are

1) only 1 2) 1 & 8

3) only 8 4) 1, 8, 49

3. For any $n \in N$, the value of the expression $\sqrt{2+\sqrt{2+\sqrt{2+...ntimes}}}$ is

1) $2\cos\left(\frac{\pi}{2^{n+1}}\right)$ 2) $2\sin\left(\frac{\pi}{2^{n+1}}\right)$

3) $\sqrt{2}\cos\left(2^{n+1}\pi\right)$ 4) $2Cos\left(2^n\pi\right)$

4. $7+77+777+.....+(777.....7 \text{ n times})=$

1) $\frac{7}{81}(10^{n+1}-9n-10)$ 2) $\frac{7}{81}(10^n-9n-10)$

3) $\frac{7}{81}(10^{n+1}+9n+10)$ 4) $\frac{7}{81}(10^{n+1}+9n-10)$

5. $\forall n \in N, 1+2x+3x^2+....+nx^{n-1}=$ $(x \in R, x \ne 1)$

1) $\frac{1-(n+1)x^n+nx^{n+1}}{(1-x)^2}$ 2) $\frac{(n+1)x^n}{(1-x)^2}$

3) $\frac{1-(n+1)x^n+nx^{n+1}}{(1+x)^2}$ 4) $\frac{(n-1)x^n}{(1+x)^2}$

6. If the sum to 'n' terms of an A.P. is $\frac{4n^2-3n}{4}$, then the n^{th} term of the A.P. is

1) $\frac{5n-1}{4}$ 2) $\frac{8n-7}{4}$ 3) $\frac{3n^2-2}{4}$ 4) $\frac{7n-8}{4}$

7. $1+\left(\frac{1}{3}+\frac{1}{3^2}\right)+\left(\frac{1}{3^3}+\frac{1}{3^4}+\frac{1}{3^5}\right)+...$ sum of the terms in the n^{th} bracket =

1) $\frac{\left(3^n-1\right)^3}{2.4^{n-1}}$ 2) $\frac{3^n-1}{2.3^{(n-1)(n+2)/2}}$

3) $\frac{3^n+1}{3.7^{n-1}}$ 4) $\frac{3^{n-1}}{2^{n+1}}$

8. The sum of the first 'n' terms of the series $1^2+2.2^2+3^2+2.4^2+5^2+2.6^2+\ldots$ is $\frac{n(n+1)^2}{2}$ when n is even. When n is odd the sum is

1) $\frac{3n(n+1)}{2}$ 2) $\frac{n^2(n+1)}{2}$

3) $\frac{n(n+1)^2}{4}$ 4) $\left[\frac{n(n+1)}{2}\right]^2$

9. If $H_n=1+\frac{1}{2}+\frac{1}{3}+\ldots+\frac{1}{n}, \forall n\in N$, then $H_1+H_2+H_3+\ldots+H_n=$

1) $(n+1)H_n-n$ 2) $(n+1)H_n+n$

3) $(n+1)H_n$ 4) $(n-1)H_n-n$

10. $S_n=\frac{1+2+3+\ldots+n}{n}$ then $S_1^2+S_2^2+S_3^2+\ldots+S_n^2=$

1) $\frac{n}{24}(2n^2+9n+13)$

2) $\frac{1}{24}(2n^2+9n+13)$

3) $\frac{n^2}{24}(2n^2+9n+13)$

4) $\frac{n}{24}(2n^2-9n+13)$

11. If $t_n=\frac{1}{4}(n+2)(n+3)$ for n = 1, 2, 3... then $\frac{1}{t_1}+\frac{1}{t_2}+\frac{1}{t_3}+\ldots+\frac{1}{t_{2003}}=$

1) $\frac{4006}{3006}$ 2) $\frac{4003}{3007}$

3) $\frac{4006}{3008}$ 4) $\frac{4006}{3009}$

12. The value of the sum in the 50th bracket of $(1)+(2+3)+(4+5+6)+(7+8+9+10)+\ldots$ is

1) 62525 2) 65225

3) 56255 4) 55625

13. $1+\frac{x}{a_1}+\frac{x(x+a_1)}{a_1a_2}+\ldots+\frac{x(x+a_1)(x+a_2)\ldots(x+a_{n-1})}{a_1a_2\ldots a_n}=$

1) $\frac{(x+a_1)(x+a_2)\ldots(x+a_n)}{a_1a_2\ldots a_n}$

2) $\frac{(x-a_1)(x-a_2)\ldots(x-a_n)}{a_1a_2\ldots a_n}$

3) $(x+a_1)(x+a_2)\ldots(x+a_n)$

4) $(x-a_1)(x-a_2)\ldots(x-a_n)$

S.P.Q. Student Practice Questions

14. $\forall$ n $\in$N, x$\in$R,

$\tan^{-1}\left[\frac{x}{1.2+x^2}\right]+\tan^{-1}\left[\frac{x}{2.3+x^2}\right]+\ldots\ldots+\tan^{-1}\left[\frac{x}{n(n+1)+x^2}\right]=$

1) $\tan^{-1}\left[\frac{x}{n}\right]-\tan^{-1}\left[\frac{x}{n+1}\right]$

2) $\tan^{-1}[x]-\tan^{-1}\left[\frac{x}{n+1}\right]$

3) $\tan^{-1}[n+1]-\tan^{-1}[x]$

4) $\tan^{-1}[x]$

15. $Tan^{-1}\left(\frac{1}{1+1+1^2}\right)+Tan^{-1}\left(\frac{1}{1+2+2^2}\right)+\ldots+Tan^{-1}\left(\frac{1}{1+n+n^2}\right)=$

1) $Tan^{-1}(n+1)+\pi$ 2) $Tan^{-1}(n+1)+\frac{\pi}{4}$

3) $Tan^{-1}(n+1)$ 4) $Tan^{-1}(n+1)-\frac{\pi}{4}$

16. $\frac{1}{2}\tan\left(\frac{x}{2}\right)+\frac{1}{4}\left(\tan\frac{x}{4}\right)+\ldots+\frac{1}{2^n}\tan\left(\frac{x}{2^n}\right)=$

1) $\frac{1}{2^n}\cot\left(\frac{x}{2^n}\right)$ 2) $\frac{1}{2^n}\cot\left(\frac{x}{2^n}\right)+\cot x$

3) $\frac{1}{2^n}\cot\left(\frac{x}{2^n}\right)-\cot x$ 4) $\cot\left(\frac{x}{2^n}\right)-\cot x$

17. Sum of first 'n' terms of the series $\frac{3}{2}+\frac{5}{4}+\frac{9}{8}+\frac{17}{16}+\ldots$

1) $n-1+2^{-n}$ 2) $n+1+2^{-n}$
3) $n+1-2^{-n}$ 4) $n-1-2^{-n}$

18. If n is even, then the sum of first 'n' terms of the series $1^2+2.2^2+3^2+2.4^2+5^2+2.6^2+\ldots\ldots$ is

1) $\frac{n(n+1)^2}{3}$ 2) $\frac{n(n+1)^2}{4}$
3) $\frac{n(n+1)^2}{2}$ 4) $\frac{n^2(n+1)}{2}$

19. If $H_n=1+\frac{1}{2}+\frac{1}{3}+\ldots\ldots+\frac{1}{n}$, then the value of $1+\frac{3}{2}+\frac{5}{3}+\ldots\ldots+\frac{2n-1}{n}$ is

1) H_n+n 2) $2n-H_n$
3) $n-1+H_n$ 4) H_n+2n

20. If $S_1=\{2\}$, $S_2=\{3,6\}$, $S_3=\{4,8,16\}$, $S_4=\{5,10,20,40\}$,..... then the sum of numbers in the set S_{15} is

1) $5(2^{15})$ 2) $16(2^{15}-1)$
3) $16(2^{16}-1)$ 4) $15(2^{15}-1)$

21. The sum of first 'n' terms of the series $1^2+(1)(2)+3^2+(3)(4)+5^2+(5)(6)+7^2+\ldots$ when n is odd is

1) $\frac{1}{12}(n+1)(4n^2-n+3)$

2) $\frac{1}{12}n(4n^2+3n-4)$

3) $\frac{1}{6}(n+1)(4n^2-n+5)$

4) $\frac{1}{6}(n)(4n^2+5n-6)$

22. The sets $S_1,S_2,S_3,\ldots$ are given by

$S_1=\left\{\frac{2}{1}\right\}$, $S_2=\left\{\frac{3}{2},\frac{5}{2}\right\}$, $S_3=\left\{\frac{4}{3},\frac{7}{3},\frac{10}{3}\right\}$, $S_4=\left\{\frac{5}{4},\frac{9}{4},\frac{13}{4},\frac{17}{4}\right\}$, ... then the sum of the numbers in the set S_{25} is

1) 322 2) 324
3) 325 4) 326

23. If $S_1=\{2\}$, $S_2=\left\{\frac{3}{2},\frac{4}{2}\right\}$, $S_3=\left\{\frac{4}{4},\frac{5}{4},\frac{6}{4}\right\}$, $S_4=\left\{\frac{5}{8},\frac{6}{8},\frac{7}{8},\frac{8}{8}\right\}$,..... then the sum of numbers in S_{20} is

1) $\frac{1220}{2^{20}}$ 2) $\frac{1563}{2^{19}-1}$
3) $\frac{1445}{2^{18}}$ 4) $\frac{1576}{2^{21}}$

24. Sum of the series $S=1^2-2^2+3^2-4^2+\ldots.-2002^2+2003^2$ is

1) 2007006 2)1005004
3) 2000506 4) none

25. The positive integer 'n' for which $2\times2^2+3\times2^3+4\times2^4+\ldots+n\times2^n=2^{n+10}$ is

1) 510 2) 511
3) 512 4) 513

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

1) $(n+1)(2n+1)$ 2) $(n+1)(2n-1)$
3) $(n-1)(2n-1)$ 4) $(n-1)(2n+1)$

DIVISIBILITY

C.R.T.Q Class Room Teaching Questions

27. $(1+x)^n-nx-1$ is divisible by (where $n\in N$)

1) $2x$ 2) x^2
3) $2x^3$ 4) all of these

28. For all positive integers $n>1$, $\{x(x^{n-1}-na^{n-1})+a^n(n-1)\}$ is divisible by

EXERCISE-IV
LEVEL-IV

1. Statement-1 : For all $n \in N$, $x^{2n-1}+y^{2n-1}$ is divisible by $x+y$
Statement-2 : If $n \in N, n^3+2n$ is divisible by 6 Which of the above statement is true:
1) only 1 2) only 2
3) both 1 & 2 4) neither 1 nor 2

2. 1. $49^n+16n-1$ is divisible by $A(n \in N)$
2. $3^{2n}+7$ is divisible by $B(n \in N)$
3. 4^n-3n-1 is divisible by $C(n \in N)$
4. $3^{3n}-26n-1$ is divisible by $D(n \in N)$
then the increasing order of A, B, C, D is
1) A, B, C, D 2) C, B, A, D
3) B, C, A, D 4) D, A, C, B

3. Statement - 1: For all $n \in N$ x^n-y^n is divisible by $x-y$
Statement - 2: x^n+y^n is divisible by $x+y$ if n is even natural number
Which of the above statement is true :
1) only 1 2) only 2
3) both 1 & 2 4) neither 1 nor 2

4. Assertion (A): For all +ve, integral values of 'n' , $3^{2n}+7$ is divisible by 8
Reason (R) : G.C.F. of 16 and 88 is 8
1) A true, R true and R is the correct explanation of A
2) A true,R true and R is not a correct explanation of A
3) A true, R false 4) A false, R true.

5. Assertion (A) : $n \in N$ product of $n(n+1)(n+2)$ is divisible by 6 Reason (R) : Product of 3 consecutive +ve integers is divisible by 3!
1) A true, R true and R is the correct explanation of A
2) A true,R true and R is not a correct explanation of A
3) A true, R false 4) A false, R true.

6. Assertion (A):
$n(n^2-1^2)(n^2-2^2)\cdots(n^2-r^2), n>r, n \in N$
is divisible by $(2r+1)!$
Reason (R) : Product of "r" consecutive natural numbers is divisible by $r!$.
1) Both A and R are true and R is the correct Explanation of A
2) Both A and R are true but R is not the correct Explanation of A
3) A is true and R is false
4) A is false and R is true

7. Statement-1: The digit in the unit place of $183!+3^{183}$ is 7.
Statement-2: 183! have unit place 0 and 3^{4k+3} ends with 7.
1) Statement-1 is true, Statement-2 is true Statement-2 is not a correct explanation for Statement-1.
2) Statement-1 is true, Statement-2 is false.
3) Statement-1 is false true.
4) Statement-1 is true, Statement-2 is Statement-2 is correct explanation for Statement-1.

8. Statement-1: If $A=(300)^{600}$, $B=600!$ $C=(200)^{600}$, then A > B > C
Statement-2: $\left(\frac{n}{2}\right)^n > n! > \left(\frac{n}{3}\right)^n$ for n>6
1) Statement-1 is true, Statement-2 is true Statement-2 is not a correct explanation for Statement-1.
2) Statement-1 is true, Statement-2 is false
3) Statement-1 is false, Statement-2 is true.