TEST INFORMATION

DATE : 19.04.2015 **CUMULATIVE TEST-01 (CT-01)**

Syllabus : Function & Inverse Trigonometric Function, Limits, Continuity & Derivability, Quadratic Equation, Application of Derivatives

REVISION DPP OF SEQUENCE & SERIES AND BINOMIAL THEOREM

Total Marks : 144		**Max. Time : 110.5 min.**
Single choice Objective (–1 negative marking) Q. 1 to Q.13	**(3 marks 2.5 min.)**	**[39, 32.5]**
Multiple choice objective (–1 negative marking) Q. 14 to 34	**(4 marks, 3 min.)**	**[84, 63]**
Comprehension (–1 negative marking) Q.35 to 37	**(3 marks 2.5 min.)**	**[9, 7.5]**
Single digit integer type (no negative marking) Q. 38,39,40	**(4 marks 2.5 min.)**	**[12, 7.5]**

1. The sum $\frac{3}{1!+2!+3!}+\frac{4}{2!+3!+4!}+....+\frac{2008}{2006!+2007!+2008!}$ is equal to

(A) $\frac{1}{2}-\frac{1}{2006!}$ (B) $\frac{1}{2}-\frac{1}{2008!}$ (C) $\frac{1}{2006!-2008!}$ (D) $\frac{1}{2007!}-\frac{1}{2008!}$

2. If $1-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+\frac{1}{9}-\frac{1}{11}+....\infty=\frac{\pi}{4}$, then the value of $\frac{1}{1.3}+\frac{1}{5.7}+\frac{1}{9.11}+....\infty$ is

(A) $\frac{\pi}{8}$ (B) $\frac{\pi}{6}$ (C) $\frac{\pi}{4}$ (D) $\frac{\pi}{36}$

3. Let A,G,H are respectively the A.M., G.M. and H.M. between two positive numbers. If xA = yG = zH where x, y, z are non-zero quantities then x, y, z are in

(A) A.P. (B) G.P. (C) H.P. (D) A.G.P.

4. The sum of the coefficients of the polynomial obtained by collection of like terms after the expansion of $(1-2x+2x^2)^{743}(2+3x-4x^2)^{744}$ is

(A) 2974 (B) 1487 (C) 1 (D) 0

5. Let $\alpha_n=(2+\sqrt{3})^n$. If [.] denotes greatest integer function and $n \in N$ then $\lim\limits_{n\to\infty}(\alpha_n-[\alpha_n])$ is equal to

(A) 1 (B) $\frac{1}{2}$ (C) $\frac{1}{3}$ (D) $\frac{2}{3}$

6. The number of natural numbers < 300 that are divisible by 6 but not by 18 is

(A) 49 (B) 37 (C) 33 (D) 16

7. If a_i, i = 1, 2, 3, 4 be four real numbers of same sign then the minimum value of $\sum\frac{a_i}{a_j}$ where i, j $\in$ {1,2 3, 4} and i $\neq$ j is

(A) 6 (B) 8 (C) 12 (D) 24

8. If $U_n=U_{n-1}+U_{n-2}$, $n \geq 3$ and $U_1=U_2=1$, then $\sum\limits_{n=2}^{\infty}\frac{U_n}{U_{n-1}\ U_{n+1}}$ is equal to

(A) 1 (B) 3 (C) 2 (D) 4

9. The value of $\left(1+\frac{1}{3}\right)\left(1+\frac{1}{3^2}\right)\left(1+\frac{1}{3^4}\right)\left(1+\frac{1}{3^8}\right)$.........to ∞ is

(A) 3 (B) 6/5 (C) 3/2 (D) 2

10. Let T_r and S_r be the r^{th} term and the sum of first 'r' terms of a series respectively. If for an odd number 'n', $S_n = n$ & $T_n = \frac{T_{n-1}}{n^2}$, then T_m (m being even) is,

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

11. The remainder, when $15^{23} + 23^{23}$ is divided by 38, is

(A) 4 (B) 17 (C) 23 (D) 0

12. The value of $\sum_{r=0}^{20} r(20-r)\left({}^{20}C_r\right)^2$ is equal to

(A) $400 \,.\, {}^{39}C_{20}$ (B) $400 \,.\, {}^{40}C_{19}$ (C) $400 \,.\, {}^{39}C_{19}$ (D) $400 \,.\, {}^{38}C_{20}$

13. The term independent from 'x' in the expansion of $\left(1+\sqrt{x}+\frac{1}{\sqrt{x}-1}\right)^{-30}$ is

(A) ${}^{30}C_{20}$ (B) 0 (C) ${}^{30}C_{10}$ (D) ${}^{30}C_5$

14. If $a = \sum_{r=0}^{20} {}^{20}C_r$, $b = \sum_{r=0}^{9} {}^{20}C_r$, $c = \sum_{r=11}^{20} {}^{20}C_r$, then

(A) a = b + c (B) $b = 2^{19} - \frac{1}{2}\ {}^{20}C_{10}$

(C) $c = 2^{19} + \frac{1}{2}\ {}^{20}C_{10}$ (D) $a - 2c = \frac{2^{10}(1.3.5.....19)}{10!}$

15. The age of the father of two children is twice that of the elder one added to 4 times that of the younger one. If the geometric mean of the ages of the two children is $4\sqrt{3}$ and their harmonic mean is 6, then father's age is 8p years. The value of p is contained in the set

(A) $\{4x : |x| \le 5, x \in R\}$ (B) $\{z : Im(z) = 0, z \in C\}$

(C) $\left\{\frac{12x}{x^2+1} : x = \sin\theta, \theta \in R\right\}$ (D) $\{5 + \cos\theta : 2\sin\theta < 1, \tan\theta > 0, \theta \in R\}$

16. The natural numbers are written as a sequence of digits 123456789101112 . . . , then in the sequence

(A) 190^{th} digit is 1 (B) 201^{st} digit is 3
(C) 2014^{th} digit is 8 (D) 2013^{th} digit is same as 2014^{th} digit

17. If $N = 7^{2014}$, then

(A) sum of last four digits of N is 23
(B) Number of divisors of N are 2014
(C) Number of composite divisors of N are 2013
(D) If number of prime divisors of N are p then number of ways to express a non-zero vector coplanar with two given non-collinear vectors as a linear combination of the two vectors is p + 1.

18. Consider the sequence of numbers $\alpha_0, \alpha_1, \ldots, \alpha_n$ where $\alpha_0 = 17.23$, $\alpha_1 = 33.23$ and $\alpha_{r+2} = \frac{\alpha_r + \alpha_{r+1}}{2}$. Then

(A) $|\alpha_{10} - \alpha_9| = \frac{1}{32}$ (B) $\alpha_0 - \alpha_1, \alpha_1 - \alpha_2, \alpha_2 - \alpha_3, \ldots$ are in G.P.

(C) $\alpha_0 - \alpha_2, 2(\alpha_1 - \alpha_2), \alpha_1 - \alpha_3$ are in H.P. (D) $|\alpha_{10} - \alpha_9| = |\alpha_8 - \alpha_7|$

19. A sequence of numbers A_n where $n \in N$ is defined as :

$A_1 = \frac{1}{2}$ and for each $n \ge 2$, $A_n = \left(\frac{2n-3}{2n}\right) A_{n-1}$, then

(A) $\sum_{K=1}^{5} A_K = 1$ (B) $\sum_{K=1}^{10} A_K < 1$ (C) $A_3 = A_1A_2$ (D) $\sum_{K=1}^{n} A_K > 1 \ \forall \ n \ge 3$

20. Given 'n' arithmetic means are inserted between each of the two sets of numbers a, 2b and 2a, b where a, b $\in$ R. If m^{th} mean of the two sets of numbers is same then

(A) $\frac{a}{b} = \frac{m}{n-m+1}$ (B) $\frac{a}{b} = \frac{n}{n-m+1}$ (C) $\frac{a}{b} < n$ (D) $\frac{a}{b} \le m$

21. If a, b, c are three terms of an A.P. such that $a \ne b$ then $\frac{b-c}{a-b}$ may be equal to

(A) 0 (B) $\sqrt{3}$ (C) 1 (D) 2

22. If $S_n = \frac{1}{3!} + \frac{5}{4!} + \frac{11}{5!} + ... + \frac{n^2+n-1}{(n+2)!}$ is sum of n terms of sequence $<t_n>$ then

(A) $t_{100} = \frac{10099}{102!}$ (B) $S_{2009} = \frac{1}{2} - \frac{1}{2011(2009!)}$

(C) $S_{2009} = \frac{1}{4} - \frac{1}{2011(2009!)}$ (D) $\lim_{n\to\infty} S_n = \frac{1}{2}$

23. Consider the sequence $<a_n>$ given by $a_n = \frac{1000^n}{n!}$, $n \in N$ then correct option is/are

(A) $a_n \to \infty$ as $n \to \infty$ (B) $a_n \to 0$ as $n \to \infty$

(C) $a_n = a_{n+1}$ for exactly one value of n (D) $a_n < a_{n+1} \ \forall \ n \in N$

24. If $a_1, a_2, a_3, \ldots$, are in A.P. with common difference d and $b_K = a_K + a_{K+1} + \ldots + a_{K+n-1}$ for $K \in N$ then

(A) $\sum_{K=1}^{n} b_K = n^2 a_n$ (B) $\sum_{K=1}^{n} b_K = (n+1)^2 a_n$

(C) $b_K = \frac{n}{2}[a_n + a_1 + 2d(K-1)]$ (D) $\sum_{K=1}^{n} b_K = n(n+1)a_n$

25. If $f(n) = \sum_{i>j\ge 0} {}^{n+1}C_i \, {}^nC_j$ then

(A) f(2) = 16 (B) f(5) = 1001

(C) f(6) = 4096 (D) all of these

26. If $(1 + x + x^2)^n = \sum_{k=0}^{2n} a_k x^k$ then $a_r - {}^nC_1 a_{r-1} + {}^nC_2 a_{r-2} - \ldots + (-1)^r \, {}^nC_r a_0$ is equal to

($\lambda \in W$ and $0 \le \lambda \le n/3$)

(A) 0 if $r \ne 3\lambda$ (B) 0 if $r = 3\lambda$ (C) non-zero if $r \ne 3\lambda$ (D) non-zero if $r = 3\lambda$

27. Which of the following is true ?

(A) ${}^{26}C_0 + {}^{26}C_1 + \ldots + {}^{26}C_{13} = 2^{25} + \frac{1}{2} \, {}^{26}C_{13}$ (B) ${}^{25}C_0 + {}^{25}C_1 + \ldots + {}^{25}C_{12} = 2^{24}$

(C) ${}^{25}C_1 - {}^{25}C_2 + {}^{25}C_3 - \ldots + {}^{25}C_{25} = -1$ (D) ${}^{25}C_1 . 3^1 - {}^{25}C_2 . 3^2 + \ldots + {}^{25}C_{25} . 3^{25} = 2^{25} + 1$

28. If ${}^{100}C_6 + 4.{}^{100}C_7 + 6.{}^{100}C_8 + 4.{}^{100}C_9 + {}^{100}C_{10}$ has value ${}^xC_y$ then x + y can take value

(A) 112 (B) 114 (C) 196 (D) 198

29. $(2 - 3x + 2x^2 + 3x^3)^{20} = a_0 + a_1x + \ldots + a_{60}x^{60}$, then

(A) $\sum_{r=1}^{30} a_{2r-1} = 0$ (B) $\sum_{r=1}^{30} a_{2r} = 2^{40} - 2^{20}$ (C) $a_0 = 2$ (D) $a_{59} = 40(3^{19})$

30. Let $(1 + x^2)^2 (1 + x)^n = \sum_{k=0}^{n+4} a_k x^k$. If $n \in N$ and a_1, a_2, a_3 are in arithmetic progression then the possible value(s) of n is/are

(A) 2 (B) 3 (C) 4 (D) 5

31. If $f(m) = \sum_{r=0}^{m} {}^{30}C_{30-r} . {}^{20}C_{m-r}$, then (if n < k then take ${}^nC_k = 0$)

(A) Maximum value of f(m) is ${}^{50}C_{25}$

(B) $f(0) + f(1) + f(2) + \ldots + f(25) = 2^{49} + \frac{1}{2} . {}^{50}C_{25}$

(C) f(33) is divisible by 37

(D) $\sum_{m=0}^{50} (f(m))^2 = {}^{100}C_{50}$

32. The value of ${}^{15}C_1 + {}^{16}C_2 + {}^{17}C_3 + \ldots + {}^{39}C_{25}$ is equal to

(A) ${}^{40}C_{15} - 1$ (B) ${}^{40}C_{24}$

(C) ${}^{25}C_1 + {}^{26}C_2 + {}^{27}C_3 + \ldots + {}^{39}C_{15}$ (D) ${}^{40}C_{25} - 1$

33. If $\left(8 + 3\sqrt{7}\right)^n$ = I + f, where 'I' is an integer, $n \in N$ and 0 < f < 1, then

(A) I is an odd integer (B) I is an even integer (C) (I + f) (1 – f) = 1 (D) (I + f) (1 – f) = 2^n

34. For natural numbers m, n, if $(1 - y)^m (1 + y)^n = 1 + a_1y + a_2y^2 + \ldots\ldots\ldots\ldots$ & $a_1 = a_2 = 10$, then

(A) m < n (B) m > n (C) m + n = 80 (D) m – n = 20

Comprehension (Q. No. 35 to 37)

Let f(n) denotes the n^{th} term of the sequence 2, 5, 10, 17, 26, ... and g(n) denotes the n^{th} term of the sequence 2, 6, 12, 20,30, ...

Let F(n) and G(n) denote respectively the sum of n terms of the above sequences.

35. $\lim_{n\to\infty} \frac{f(n)}{g(n)} =$

(A) 1 (B) 2 (C) 3 (D) does not exist

36. $\lim_{n\to\infty} \frac{F(n)}{G(n)} =$

(A) 0 (B) 1 C) 2 (D) does not exist

37. $\lim_{n\to\infty}\left(\frac{F(n)}{G(n)}\right)^n - \lim_{n\to\infty}\left(\frac{f(n)}{g(n)}\right)^n =$

(A) $\frac{\sqrt{e}-1}{e\sqrt{2}}$ (B) $\frac{\sqrt{e}+1}{e\sqrt{e}}$ (C) $\frac{1-\sqrt{e}}{e\sqrt{e}}$ (D) $\frac{e\sqrt{e}}{1+\sqrt{e}}$

38. Let S denote the sum of the series $\frac{3}{2^3} + \frac{4}{2^4.3} + \frac{5}{2^6.3} + \frac{6}{2^7.5} + \frac{7}{2^7.15} + \ldots\ldots \infty$, then the value of S^{-1} is

39. If $S = 1 + \frac{4}{3} + 1 + \frac{16}{27} + \ldots\ldots\ldots \infty$, then find the value of [S] (where [.] is G.I.F.)

40. The value of $\lim_{n\to\infty} \sum_{r=1}^{n}\left(\sum_{t=0}^{r-1} \frac{1}{5^n} {}^nC_r \, {}^rC_t 3^t\right)$ is equal to

DPP # 3

REVISION DPP OF APPLICATION OF DERIVATIVES

1.	(C)	**2.**	(B)	**3.**	(A)	**4.**	(C)	**5.**	(A)	**6.**	(D)	**7.**	(B)
8.	(A)	**9.**	(A)	**10.**	(B)	**11.**	(D)	**12.**	(C)	**13.**	(A)	**14.**	(A)
15.	(B)	**16.**	(D)	**17.**	(C)	**18.**	(A)	**19.**	(A,D)	**20.**	(A,C,D)		
21.	(A,B,C)	**22.**	(B,D)	**23.**	(A,C,D)	**24.**	(C,D)	**25.**	(A,C)	**26.**	(B,C)		
27.	(B,C)	**28.**	(A,B)	**29.**	(C,D)	**30.**	(A,B,C,D)			**31.**	(A,B)		
32.	(A,C,D)	**33.**	(A,C,D)	**34.**	(A,B,C,D)			**35.**	(A,B)	**36.**	(A,B,C,D)		
37.	(B)	**38.**	(A)	**39.**	(D)	**40.**	5						