DPP - Daily Practice Problems

Chapter-wise Sheets

Date : | **Start Time :** | **End Time :**

MATHEMATICS CM06

SYLLABUS : Binomial Theorem

Max. Marks : 74 **Time : 60 min.**

GENERAL INSTRUCTIONS

- The Daily Practice Problem Sheet contains 20 Questions divided into 5 sections.
  Section I has **6** MCQs with ONLY 1 Correct Option, **3** marks for each correct answer and **–1** for each incorrect answer.
  Section II has **4** MCQs with ONE or MORE THAN ONE Correct options.
  For each question, marks will be awarded in one of the following categories:
  Full marks: **+4** If only the bubble(s) corresponding to all the correct option(s) is (are) darkened.
  Partial marks: **+1** For darkening a bubble corresponding to each correct option provided NO INCORRECT option is darkened.
  Zero marks: If none of the bubbles is darkened.
  Negative marks: **–2** In all other cases.
  Section III has **4** Single Digit Integer Answer Type Questions, **3** marks for each Correct Answer and **0** mark in all other cases.
  Section IV has Comprehension Type Questions having **4** MCQs with ONLY ONE corect option, **3** marks for each Correct Answer and **0** mark in all other cases.
  Section V has **2** Matching Type Questions, **2** marks for the correct matching of each row and **0** mark in all other cases.
- You have to evaluate your Response Grids yourself with the help of Solutions.

Section I - Straight Objective Type

This section contains 6 multiple choice questions. Each question has 4 choices (a), (b), (c) and (d), out of which **ONLY ONE** is correct.

1. If $(1 + x - 2x^2)^6 = 1 + a_1x + a_2x^2 + a_3x^3 + \ldots$ and $k = a_2 + a_4 + a_6 + \ldots + a_{12}$ then which one of the following is true about k?

(a) k is a perfect square
(b) k is a prime number
(c) k is a perfect cube
(d) k is more than 64

2. Consider a function $f(x) = \left(1 - \frac{1}{x}\right)$. Then term independent of x in the expansion of $(f(x))^n \cdot \left(f\left(-\frac{1}{x}\right)\right)^n$ is

(a) 0, if n is odd
(b) $(-1)^{\frac{n-1}{2}} \cdot {}^nC_{\frac{n-1}{2}}$, if n is odd
(c) $(-1)^{n/2} \cdot {}^nC_{\frac{n}{2}-1}$, if n is even
(d) None of the above

RESPONSE GRID 1. ⓐⓑⓒⓓ 2. ⓐⓑⓒⓓ

Space for Rough Work

3. If $(1+x)^n = C_0 + C_1x + C_2x^2 + ... + C_nx^n$, then

$\sum_{0\le i\le j}\sum_{j\le n}(C_i + C_j)^2$ is equal to

(a) $(n-1)\ {}^{2n}C_n + 2^{2n}$
(b) $n\ {}^{2n}C_n + 2^{2n}$
(c) $(n+1)\ {}^{2n}C_n + 2^{2n}$
(d) None of these

4. The number of integral solutions of the equation $x+y+z+w=20$, if $x \ge 1,\ y \ge 2, z \ge 3, w \ge 4$, is

(a) 286 (b) 78
(c) 715 (d) 1001

5. If I is integral part of $(2+\sqrt{3})^n$ and f is its fractional part. Then $(I+f)(1-f)$ is

(a) $I+1$ (b) 1
(c) n (d) 2^n

6. If coefficient of x^n in $(1+x)^{101}(1-x+x^2)^{100}$ is non-zero, then n cannot be of the form

(a) $3r+1$ (b) $3r$
(c) $3r+2$ (d) $4r+1$

Section II - Multiple Correct Answer Type

This section contains 4 multiple correct answer(s) type questions. Each question has 4 choices (a), (b), (c) and (d), out of which **ONE OR MORE** is/are correct.

7. Suppose $x_1, x_2, \ldots, x_n (n > 2)$ are real numbers such that $x_i = -x_{n-i+1}$ for $1 \le i \le n$. Consider the sum $S_n = \sum\sum\sum x_i x_j x_k$ $(1 < i, j, k \le n)\ (i, j, k\ distinct)$ then which of the following is true?

(a) $S_{10} = 121$ (b) $S_{10} = S_{20}$
(c) $S_{14} = 0$ (d) $S_{30} > S_{31}$

8. Which all statements are correct?

(a) The number of integral terms in the expansion of $(\sqrt{3} + \sqrt[8]{5})^{256}$ is k then $k > 30$
(b) The number of integral terms in the expansion of $(\sqrt{3} + \sqrt[8]{5})^{256}$ is k then $k < 40$
(c) Number of distinct terms in the expansion of $(x+y-z)^{16}$ is k then $k > 140$
(d) Number of distinct terms in the expansion of $(x+y-z)^{16}$ is k then $k < 150$

9. If $f(n) = \sum_{r=1}^{n}[r(n^{n-1}C_{r-1} - r\ {}^nC_{r-1}) + (2r+1)\ {}^nC_r]$,

then

(a) $f(10) = 120$ (b) $f(20) = 440$
(c) $\sum_{n=1}^{10} f(n) = 495$ (d) $\sum_{n=1}^{10} f(n) = 374$

10. The integer just greater than $(\sqrt{3}+1)^{2m}$ is

(a) divisible by 2^{m+1} (b) divisible by 3^{m+1}
(c) divisible by 2^m (d) divisible by 3^m

Section III - Integer Type

This section contains 4 questions. The answer to each of the questions is a single digit integer ranging from 0 to 9.

11. If $\sum_{r=0}^{n}\left(\frac{r+2}{r+1}\right)C_r = \frac{2^8-1}{6}$, then n is equal to

RESPONSE GRID					
3. ⓐⓑⓒⓓ	**4.** ⓐⓑⓒⓓ	**5.** ⓐⓑⓒⓓ	**6.** ⓐⓑⓒⓓ	**7.** ⓐⓑⓒⓓ
8. ⓐⓑⓒⓓ	**9.** ⓐⓑⓒⓓ	**10.** ⓐⓑⓒⓓ	**11.** ⓪①②③④⑤⑥⑦⑧⑨	

Space for Rough Work

12. Given $\left(1-2x+5x^2-10x^3\right)(1+x)^n = 1+a_1x+a_2x^2+\ldots$ and that $a_1^2 = 2a_2$, then the value of n is

13. If the expansion of $(1 + x + x^2)^n$ be written as $a_0 + a^1x + a_2x^2 + \ldots\ldots + a_{2n}x^{2n}$, then the value of $\frac{a_0 + a_1 + a_3 + a_4 + a_6 + a_7 + \ldots}{a_2 + a_5 + a_8 + \ldots}$ if n is a multiple of 3.

14. If $(1+ax)^n = 1 + 8x + 24x^2 + \ldots\ldots$; then $9\left(\frac{n-a}{a+n}\right)$ is equal to (n being a positive Integer)

Section IV - Comprehension Type

Based upon the given paragraphs, 4 multiple choice questions have to be answered. Each question has 4 choices (a), (b), (c) and (d), out of which **ONLY ONE** is correct.

PARAGRAPH-1

If ${}^nC_0, {}^nC_1, {}^nC_2, \ldots, {}^nC_n$ denote the binomial coefficients in the expansion of $(1+x)^n$ and $a+b=1$, then

15. Find the value of $\sum_{r=0}^{n} r\ {}^nC_r a^r b^{n-r}$ is

(a) na^2 (b) nab
(c) na (d) None of these

16. If ${}^nC_0, {}^nC_1, {}^nC_2, \ldots, {}^nC_n$ denote the binomial coefficients in the expansion of $(1+x)^n$ and $p+q=1$, then $\sum_{r=0}^{n} r^2\ {}^nC_r p^r q^{n-r}$ is

(a) np (b) npq
(c) $n^2p^2 + npq$ (d) None of these

PARAGRAPH-2

The binomial expansion is defined as

$(x+y)^n = \sum_{r=0}^{n} C_r\ x^{n-r}\ y^r$, where $C_r = {}^nC_r$.

17. The value of $\sum_{0\le i<j\le n} \sum i \cdot {}^nC_j$ is equal to

(a) $n(n+1)2^{n-3}$ (b) $n^2 2^{n-3}$
(c) $n(n-1)2^{n-3}$ (d) None of these

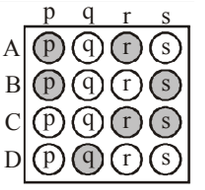
18. The value of $\sum_{0\le i<j\le n} \sum j \cdot {}^nC_i$ is equal to

(a) $n^2 2^{n-3}$ (b) $n(n+3)2^{n-3}$
(c) $(n+3)2^{n-3}$ (d) None of these

RESPONSE GRID	12. ⓪①②③④⑤⑥⑦⑧⑨ 13. ⓪①②③④⑤⑥⑦⑧⑨ 14. ⓪①②③④⑤⑥⑦⑧⑨ 15. ⓐⓑⓒⓓ 16. ⓐⓑⓒⓓ 17. ⓐⓑⓒⓓ 18. ⓐⓑⓒⓓ

Space for Rough Work

Section V - Matrix-Match Type



This section contains 2 questions. It contains statements given in two columns, which have to be matched. Statements in column I are labelled as A, B, C and D whereas statements in column II are labelled as p, q, r and s. The answers to these questions have to be appropriately bubbled as illustrated in the following example. If the correct matches are A-p, A-r, B-p, B-s, C-r, C-s and D-q, then the correctly bubbled matrix will look like the following:

19. Match the statement of Column I with values of Column II.

	Column I		**Column II**
(A)	If (r + 1)th term is the first negative term in the expansion of $(1+x)^{7/2}$, then the value of r where $\|x\| < 1$ is (x is + ve).	(p)	Divisible by 7
(B)	The coefficient of y in the expansion of $(y^2 + 1/y)^5$ is	(q)	A perfect square
(C)	If the second term in the expansion $\left(a^{\frac{1}{13}} + \frac{a}{\sqrt{a^{-1}}}\right)^n$ is $14a^{5/2}$, then the value of n is	(r)	Divisible by 10
(D)	The sum of coefficient of x^2, x^4, x^6, x^8 in the expression $(1 + 2x + 3x^2 + 4x^3 + \ldots \text{ up to } \infty)^{1/2}$ is (where $\|x\| < 1$) is	(s)	A prime number

20. Match the following.

	Column I		**Column II**
(A)	Let n be an odd natural number greater than 1. Then the number of zeroes at the end of the sum $99^n + 1$ is	(p)	6
(B)	Let $f(n)=10^n + 3 \cdot 4^{n+2} + 5$, $n \in N$. The greatest value of the integer which divides f(n) for all n is	(q)	0
(C)	If $x + \frac{1}{x} = 1$ and $p = x^{1000} + \frac{1}{x^{1000}}$ and q be the digit at unit place in the number $2^{4n} + 1$, $n \in N$ and $n > 1$, then p + q =	(r)	2
(D)	For integer $n > 1$, the digit at unit place in the number $\sum_{r=0}^{100} r! + 2^{2n}$ is	(s)	9

RESPONSE GRID	**19. A - ⓟⓠⓡⓢ; B - ⓟⓠⓡⓢ; C - ⓟⓠⓡⓢ; D - ⓟⓠⓡⓢ** **20. A - ⓟⓠⓡⓢ; B - ⓟⓠⓡⓢ; C - ⓟⓠⓡⓢ; D - ⓟⓠⓡⓢ**

DAILY PRACTICE PROBLEM DPP CM06 - MATHEMATICS			
Total Questions	20	Total Marks	74
Attempted		Correct	
Incorrect		Net Score	
Cut-off Score	25	Qualifying Score	36

$$\text{Net Score} = \sum_{i=1}^{V} \left[(\text{correct}_i \times MM_i) - (In_i - NM_i) \right]$$

Space for Rough Work