HALF YEARLY EXAMINATION - 2019

SAMPLE PAPER – 01 (2019-20)

SUBJECT: MATHEMATICS (041)

BLUE PRINT : CLASS XI

Chapter	MCQ (1 mark)	FIB (1 mark)	VSA (1 mark)	SA (2 marks)	LA - I (4 marks)	LA- II (6 marks)	Total
Sets	1(1)	**1(1)***	--	2(1)	--	6(1)	**10(4)**
Relations and Functions	1(1)	--	1(1)	**2(1)***	4(1)	--	**8(4)**
Trigonometric Functions	2(2)	**1(1)***	--	2(1)	**4(1)***	--	**9(5)**
Principle of Mathematical Induction	--	--	--	--	4(1)	**6(1)***	**10(2)**
Complex Numbers and Quadratic Equations	1(1)	1(1)	1(1)	2(1)	**4(1)***	--	**9(5)**
Linear Inequalities	--	--	--	2(1)	--	**6(1)***	**8(2)**
Permutations and Combinations	2(2)	--	1(1)	**2(1)***	4(1)	--	**9(5)**
Binomial Theorem	1(1)	1(1)	**1(1)***	--	--	6(1)	**9(4)**
Sequences and Series	2(2)	1(1)	1(1)	--	4(1)	--	**8(5)**
Total	**10(10)**	**5(5)**	**5(5)**	**12(6)**	**24(6)**	**24(4)**	**80(36)**

Note: * - Internal Choice Questions

HALF YEARLY EXAM SAMPLE PAPER 01 (2019-20)

SUBJECT: MATHEMATICS **MAX. MARKS : 80**
CLASS : XI **DURATION : 3 HRS**

General Instruction:
(i) All the questions are compulsory.
(ii) The question paper consists of **36** questions divided into 4 sections A, B, C, and D.
(iii) **Section A** comprises of **20 questions** of **1 mark** each. **Section B** comprises of **6 questions** of **2 marks** each. **Section C** comprises of **6 questions** of **4 marks** each. **Section D** comprises of **4 questions** of **6 marks** each.
(iv) There is no overall choice. However, an internal choice has been provided in three questions of 1 mark each, two questions of 2 marks each, two questions of 4 marks each, and two questions of 6 marks each. You have to attempt only one of the alternatives in all such questions.
(v) Use of calculators is not permitted.

SECTION – A

Questions 1 to 20 carry 1 mark each.

1. Two finite sets have m and n elements respectively. The total number of subsets of first set is 56 more than the total number of subsets of the second set. The values of m and n respectively are.
(a) 7, 6 (b) 5, 1 (c) 6, 3 (d) 8, 7

2. Let n (A) = m, and n (B) = n. Then the total number of non-empty relations that can be defined from A to B is
(a) m^n (b) $n^m - 1$ (c) $mn - 1$ (d) $2^{mn} - 1$

3. The greatest value of sin x cos x is
(a) 1 (b) 2 (c) $\sqrt{2}$ (d) $\frac{1}{2}$

4. The value of sin 20° sin 40° sin 60° sin 80° is
(a) $\frac{-3}{16}$ (b) $\frac{5}{16}$ (c) $\frac{3}{16}$ (d) $\frac{1}{16}$

5. Number of solutions of the equation $z^2 + |z|^2 = 0$ is
(a) 1 (b) 2 (c) 3 (d) infinitely many

6. In how many ways a committee consisting of 3 men and 2 women, can be chosen from 7 men and 5 women?
(a) 45 (b) 350 (c) 4200 (d) 230

7. The number of signals that can be sent by 6 flags of different colours taking one or more at a time is
(a) 63 (b) 1956 (c) 720 (d) 21

8. The total number of terms in the expansion of $(x + a)^{51} – (x – a)^{51}$ after simplification is
(a) 102 (b) 25 (c) 26 (d) None of these

9. In an A.P. the pth term is q and the (p + q)th term is 0. Then the qth term is
(a) – p (b) p (c) p + q (d) p – q

10. In a G.P. of positive terms, if any term is equal to the sum of the next two terms. Then the common ratio of the G.P. is
(a) sin 18° (b) 2 cos18° (c) cos 18° (d) 2 sin 18°

11. The largest coefficient in the expansion of $(1 + x)^{30}$ is ________________ .

12. If 3 tan (θ – 15°) = tan (θ + 15°), 0° < θ < 90°, then θ = _________

OR

The radius of the circle in which a central angle of 60° intercepts an arc of length 37.4 cm is _______

13. Let A = { 1, 2, 3, 4, 5, 6}, B = { 2, 4, 6, 8 } then A – B = _______________

OR

The set {5, 25, 125, 625} in the set-builder form is ____________

14. The conjugate of the complex number $\frac{1-i}{1+i}$ is _____.

15. The third term of a G.P. is 4, the product of the first five terms is ....

16. Given R = {(x, y) : x, y ∈ W, $x^2 + y^2 = 25$}. Find the domain and Range of R.

17. Evaluate : $(1 + i)^6 + (1 – i)^3$.

18. Find the coefficient of x^{15} in the expansion of $(x – x^2)^{10}$.

OR

Write the general term in the expansion of $(x^2 – y)^6$

19. How many numbers are there between 99 and 1000 having 7 in the units place?

20. If x, 2y, 3z are in A.P., where the distinct numbers x, y, z are in G.P. then the find the common ratio of the G.P.

SECTION – B

Questions 21 to 26 carry 2 marks each.

21. Solve $3x + 2y > 6$ graphically.

22. Find the multiplicative inverse of $4 – 3i$.

23. Find the number of arrangements of the letters of the word INDEPENDENCE. In how many of these arrangements do the words start with P.

OR

Find the value of n such that $\frac{{}^{n}P_4}{{}^{n-1}P_4} = \frac{5}{3}, n > 4$

24. Prove that: $\frac{\cos 7x + \cos 5x}{\sin 7x - \sin 5x} = \cot x$

25. If A = {3, 6, 9, 12, 15, 18, 21}, B = { 4, 8, 12, 16, 20 }, C = { 2, 4, 6, 8, 10, 12, 14, 16 }, D = {5, 10, 15, 20 }; find (i) A – B (ii) A – C (iii) A – D (iv) B – A

26. Let A = {1, 2, 3, 4, 6}. Let R be the relation on A defined by $\{(a, b)$: $a,\ b \in A$, b is exactly divisible by $a\}$. (i) Find the domain of R (ii) Find the range of R

OR

Find the domain and the range of the real function f defined by f (x) = | x – 4|.

SECTION – C

Questions 27 to 32 carry 4 marks each.

27. A committee of 7 has to be formed from 9 boys and 4 girls. In how many ways can this be done when the committee consists of: (i) exactly 3 girls ? (ii) at least 3 girls ? (iii) at most 3 girls ?

28. Find the sum of the first n terms of the series: 3+ 7 +13 +21 +31 +…

OR

If a, b, c are in A.P.; b, c, d are in G.P. and $\frac{1}{c}, \frac{1}{d}, \frac{1}{e}$ are in A.P. prove that a, c, e are in G.P.

29. Find the domain and range of the function (i) $f(x) = \sqrt{x-1}$ (ii) $f(x) = |x-1|$

30. Find the modulus and argument of the complex number $\frac{1+2i}{1-3i}$

OR

If $z_1 = 2 - i$, $z_2 = 1 + i$, find $\left|\frac{z_1 + z_2 + 1}{z_1 - z_2 + i}\right|$

31. Solve $\sin 3x + \sin 2x - \sin x = 0$

32. Prove by using Mathematical Induction for all $n \in N$ that n (n + 1) (n + 5) is a multiple of 3.

SECTION – D

Questions 33 to 36 carry 6 marks each.

33. Prove by using Mathematical Induction for all $n \in N$ that

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

OR

Prove by using Mathematical Induction for all $n \in N$ that

$$\frac{1}{1.4} + \frac{1}{4.7} + \frac{1}{7.10} + \dots\dots + \frac{1}{(3n-2)(3n+1)} = \frac{n}{(3n+1)}.$$

34. The coefficients of the $(r - 1)$th, rth and $(r + 1)$th terms in the expansion of $(x + 1)^n$ are in the ratio 1 : 3 : 5. Find n and r.

35. Solve the system of inequalities graphically: $3x + 2y \leq 150$, $x + 4y \leq 80$, $x \leq 15$, $y \geq 0$

OR

How many litres of water will have to be added to 1125 litres of the 45% solution of acid so that the resulting mixture will contain more than 25% but less than 30% acid content?

36. In a class, 36 students offered physics, 48 students offered chemistry and 50 students offered mathematics. Of these, 13 are in both chemistry and mathematics; 26 in physics and chemistry; 11 in mathematics and physics and 6 in all the subjects.
Find (i) how many students are there in the class (ii) how many students offered only mathematics and (iii) how many students are taking exactly two of the three subjects.