Year of Quality education
18th

CLASS XI

Reg. No. ☐☐☐☐☐☐

Candidates must write the code on the title page of the Answer-book

General Instructions :-

1. All questions are compulsory.
2. The question paper consists of 29 questions divided into three sections A, B and C. Section A contains 10 questions of 1 marks each, Section B is of 12 questions of 4 marks each and Section C is of 7 questions of 6 marks each.
3. Write the serial number of the question before attempting it.
4. If you wish to answer any question already answered, cancel the previous answer.
5. In questions where internal choices is provided. You must attempt only one choice.

MATHEMATICS

Time Allowed : 3 hours   Maximum Marks : 80

PART – A

(1) Find f (-3) where $f(x) = 3x^2 - 7$.

(2) Solve for θ and write general solution: $\tan 2\theta \tan \theta = 1$.

(3) Find the centre and radius of the circle $x^2 + y^2 - 8x + 10y - 12 = 0$.

(4) If $^nC_8 = {}^nC_2 \, find \, ^nC_2$

(5) Find the value of $\sin\left(-\dfrac{19\,\pi}{3}\right)$.

(6) Find the derivative of $(3\sin x + 2\cos x)(2x^3 - 5x + 7)$.

(7) Solve the following equation $2x^2 + 3ix + 2 = 0$.

(8) Insert three geometric means between the numbers 1 and 256 .

(9) Find the equation of the directrix and the length of the latus rectum $y^2 = -8x$.

(10) Write the negation of the "All triangles are not equilateral triangles" statements.

PART – B

(11) Convert the complex number $z = \dfrac{i - 1}{\cos\dfrac{\pi}{3} + i\sin\dfrac{\pi}{3}}$.

(12) Find the two middle terms of $\left(2x - \dfrac{x^2}{4}\right)^9$.

(13) How many terms of the A.P. – 6, -11/2 , – 5, … are needed to give the sum –25?

OR

How many terms of the G.P. 3 , 3/2 ,3/4 , …………………,... are needed to give the sum 3069 / 512 .

(14) Find the equations of the lines which pass through (4,5) and make an angle of 45^0 with the line x+y =2 .

(15) In an examination, a question paper consists of 12 questions divided into two parts i.e., Part I and Part II, containing 5 and 7 questions, respectively. A student is required to attempt 8 questions in all, selecting at least 3 from each part. In how many ways can a student select the questions ?

OR

Find the number of words with or without meaning which can be made using all the letters of the word **AGAIN**. If these words are written as in a dictionary, what will be the 50th word?

(16) The ratio of the first to the last of n A.M, s between 5 and 35 is 1:4.Find n.

(17) By the principle of mathematical induction, prove that for all $n \in N$

$$\dfrac{1}{3.7} + \dfrac{1}{7.11} + \dfrac{1}{11.15} + ... + \dfrac{1}{(4n-1)(4n+3)} = \dfrac{n}{3(4n+3)} .$$

(18) Find the number of 4-digit numbers that can be formed using the digits 1, 2, 3, 4, 5 if no digit is repeated. How many of these will be even?

OR

How many words, with or without meaning, each of 3 vowels and 2 consonants can be formed from the letters of the word **INVOLUTE** ?

(19) Three vertices of a parallelogram ABCD are A (3,-1,2) B (1, 2 ,- 4)and C (- 1 , 1 , 2) .Find the coordinates of the fourth vertex.

(20) Solve for x: $\dfrac{x}{4} < \dfrac{5x-2}{3} - \dfrac{7x-3}{5}$.

OR

Find all pairs of consecutive odd positive integers both of which are smaller than 10 such that their sum is more than 11.

(21) Find the equation for the ellipse that satisfies the Vertices $(\pm 5,0)$, $foci(\pm 4,0)$.

(22) If p is the length of perpendicular from the origin to the line whose intercepts on the axes are a and b, then show that

$\dfrac{1}{p^2} = \dfrac{1}{a^2} + \dfrac{1}{b^2}$.

PART – C

(23) A triangle is formed by the lines x + y -6 = 0,3y – x + 2 = 0 and 3y = 5x + 2 , find the co-ordinates of its orthocenter.

OR

Find the equation of the circle passing through the points (2,3) and (-1,1) and whose centre is on the line x – 3y -11 = 0

(24) Find a , b and n in the expansion of $(a+b)^n$ if the first three terms of its expansion are 729, 7290 and 30375 respectively.

(25) Prove that : $\dfrac{(\sin 7x + \sin 5x) + (\sin 9x + \sin 3x)}{(\cos 7x + \cos 5x) + (\cos 9x + \cos 3x)} = \tan 6x$.

(26) Find the coordinates of the foci, the vertices, the length of major axis , the minor axis, the eccentricity and the length of the latus rectum of the ellipse $\dfrac{x^2}{4} + \dfrac{y^2}{25} = 1$.

(27) In class XI of a school 40% of the students study Mathematics and 30% study Biology.10% of the class study both mathematics and Biology. If a student is selected at random from the class, find the probability that he will he studying Mathematics or Biology.

(28) Find $\displaystyle\lim_{x \to 0} f(x),$ where $f(x) = \begin{cases} \dfrac{x}{|x|}, & x \neq 0 \\ 0, & x = 0 \end{cases}$.

OR

Differentiate the following functions with respect to x from first principles $\cos\sqrt{x}$.

(29) Find the mean deviation about median for the following data:

Marks	0-10	10-20	20-30	30-40	40-50	50-60
Number of Girls	6	8	14	16	4	2 .

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