MODEL QUESTION PAPER II
SUB : MATHEMATICS
CLASS XI

Time : 3 hours   Max Marks : 100

GENERAL INSTRUCTION

1.   All questions are compulsory.
2.   The question paper consists of 29 questions divided into three sections A, B and C. Section A comprises of 10 questions of one mark each, Section B comprises of 12 questions of four marks each and Section C comprises of 7 questions of six marks each.
3.   All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.
4.   There is no overall choice. However internal choice has been provided in 4 questions of 4 marks each and 2 questions of 6 marks each. You have to attempt only one of the alternatives in all such questions.
5.   Use of calculator is not permitted. You may ask for logarithmic tables if required.

Section A

Q.1   If $f(x) = x^2 - 3x + 1$ and $f(2\alpha) = 2f(\alpha)$ then find the value of α.

Q.2   Write the set{ x: x is a prime natural number which divides 5151 in tabular form }

Q.3   How many words can be formed out of letters of the word. TRIANGLE ? How many of these will begin with T and end with E ?

Q.4   Find the third term in the expansion of $\left(x - \dfrac{1}{x^2}\right)^7$

Q.5   Identify the quantifier in the following statement " there exists a real number whose square is not positive " and write its negation.

Q.6   Find the component statement of the following compound statement. " 100 is divisible by 3, 11 and 5 " and check whether it is true or false.

Q.7   Find the mode and median of the following data 2,3,2,4,6,4,5,4,3,1,4,6.

Q.8   Let $f(x) = \begin{cases} x^2 + 1, x \leq 2 \\ x + 3, x > 2 \end{cases}$

Evaluate it   f(x)
$$x\text{--}\rightarrow 2^-$$

Q.9   Let A = { 2, 3, 4, 5, 6 }. Let R be the relation on A defined by the rule x
R y iff x divides y. Find R as a subset of A X A.

Q.10 Write the contra positive and converse of the following statement.
" Something is cold implies that it has low temperature ".

Section B

Q.11 Find the equation of the line passing through the point of intersection of
the lines 4x+7y-3=0 and 2x-3y+1=0 that has equal intercepts on the axes.

Q.12 Find the ratio in which the YZ – plane divide the line segment formed by
joining the point (-2, 4, 7) and (3, -5, 8). Also find the cordinates of the
point of intersection.

Q.13 If the different permutations of all the letter of the word
EXAMINATION are listed as in a dictionary. How many words are there
in this list before the first word starting with E ?

OR

In how many ways can the letters of the word ASSASSINATION be
arranged so that all the S's are together ?

Q.14 If $a + ib = (x + i)^2/(2x^2 + 1)$ prove that $a^2 + b^2 = (x^2 + 1)^2/(2x^2 + 1)^2$

OR

If $(x + iy)^3 = u + iv$, then show that $u/x + v/y = 4(x^2 - y^2)$

Q.15 Let f = { (x, $x^2/(1 + x^2)$) , x ∈ R } be a function from R into R. Determine the range of f.

Q.16 A box contains 10 red marbles 20 blue marbles and 30 green marbles. 5 marbles are drawn from the box. What is the probability that

(i) all will be blue.
(ii) at least one will be green.

Q.17 Find the term independent of x in the expansion of $(x^2/6 - 3/x^3)^{10}$, x ≠ 0.

Q.18 If A, B, C are any three sets. Prove that A − (B ∪ C) = (A − B) ∩ (A - C)

OR

For any two sets A and B. Show that
(A ∪ B) − (A ∩ B) = (A − B) ∪ (B − A)

Q.19 Prove that cos 7x + cos 5x + cos 3x +cos x = 4 cos x cos 2x cos 4x

OR

Find the general solution of the following equation :
$Sec^2 2x = 1 - \tan 2x$

Q.20 Find the derivative of sin 2x from first principle.

OR

Find the derivative of (x − 1) (x − 2) from first principle.

Q.21 Suppose that $f(x) = \begin{cases} a + bx, x < 1 \\ 4, x = 1 \\ b - ax, x > 1 \end{cases}$ and if $\underset{x \to 1}{lt(fx)} = f(1)$

Find possible values of a and b

Q.22 Find x and y if

$$\frac{(1+i)x-2i}{3+i} + \frac{(2-3i)y+i}{3-i} = i$$

Section C

Q.23 If the first and nth term of a G.P. are a and b respectively, and if P is the product of n terms, prove that $P^2 = (ab)^n$

OR

If pth, qth and rth terms of an A.P. are a, b, c respectively, show that
$(q-r)a + (r-p)b + (p-q)c = 0$

Q.24 (i)Find the equation of the circle passing through the points (4, 1) and (6, 5) and whose centre is on the line 4x+y=16.

(ii)Find eccentricity and Latus rectum of the ellipse $4x^2 + 9y^2 = 36$

Q.25 Find sin x/2 cos x/2 and tan x/2
If tan x = -4/3 , x in quadrant II

Q.26 Solve the following system of in equalities
$4x + 3y \le 60, y \ge 2x, x \ge 3, x, y \ge 0$

Q.27 Prove the following by the principle of Mathematical Induction. For all n $\in$ N

1+ 1/(1+2) + 1/(1+2+3) + …………+ 1/(1+2+3+……n) = 2n/(n+1)

OR

Prove by the principle of Mathematical Induction for all n $\in$ N $3^{2n+2} - 8n - 9$ is divisible by 8.

Q.28 In an university, out of 100 students 15 offered Mathematics only; 12 offered statistics only; 8 offered only Physics; 40 offered Physics and Mathematics; 20 offered Physics and Statistics; 10 offered Mathematics and Statistics, 65 offered Physics. Find the number of students who

(i)   offered Mathematics
(ii) offered Statistics

(iii)   did not offer any of the above three subjects.

Q.29 Find the mean and variance for the following frequency distribution

Class	0-30	30-60	60-90	90-120	120-150	150-180	180-210
Frequency	2	3	5	10	3	5	2

Mrs. Seema Surolia
PGT Maths
KV 1 Indore SHIFT-II

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SAMPLE PAPER
SUBJECT – MATHS
CLASS – XI
BLUE PRINT

			VSA	SA	LA	Total
			(1) Marks	(4) Marks	(6) Marks	
1	(a)	Sets	1(1)	4(1)	6(1)	
	(b)	Relation & function	2(2)	4(1)		27(8)
	(c)	Trigonometric functions		4(1)	6(1)	
2	(a)	Mathematical Induction			6(1)	
	(b)	Complex numbers and				
		quadratic equation		8(2)		
	(c)	Linear Inequalities			6(1)	36(09)
	(d)	Permutation and Combination	1(1)	4(1)		
	(e)	Binomial theorem	1(1)	4(1)		
	(f)	Sequence and Series			6(1)	
3	(a)	Straight lines		4(1)		
	(b)	Conic Section			6(1)	14(3)
	(c)	Three dimentional Geo.		4(1)		
4	(a)	Limits and derivatives	1(1)	8(2)		9(3)
5	(a)	Mathematical Reasoning	3(3)			3(3)
6	(a)	Statistics	1(1)		6(1)	
	(b)	Probability		4(1)		11(3)

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