Atomic Energy Central School, Indore
Class XI ; Sub- Mathematics
Blue Print of Annual Examination 2020-21

Unit	Name of the Chapter	VSA (1 mark)	Case Study (4 marks)	SA (2 marks)	LA I (3 marks)	LA II (5 marks)	Chapter wise total marks	Total marks of the unit
I: Sets &Functions (23 marks)	Sets	0	0	1	1	1	10	23
	Relation & Function	2	0	1	0	0	04	
	Trigonometric Functions	2	0	2	1	0	09	
II: Algebra (30 marks)	Principle of Mathematical Induction	Deleted for the session 2020-21						30
	Complex Numbers & Quadratic Equations	2	0	1	1	0	07	
	Linear Inequalities	2	0	0	0	1	07	
	Permutations & Combinations	1	0	1	1	0	06	
	Binomial Theorem	Deleted for the session 2020-21						
	Sequence & Series	2	0	1	2	0	10	
III: Coordinate Geometry (10 marks)	Straight Line	1	0	1	0	0	03	10
	Conic Sections	0	1	0	0	0	04	
	Introduction to Three Dimensional Geometry	1	0	1	0	0	03	
IV: Calculus (5 marks)	Limits & Derivatives	2	0	1	1	0	07	07
V: Mathematical Reasoning (2 marks)	Mathematical Reasoning	Deleted for the session 2020-21						-
VI: Statistics & Probability (10 marks)	Statistics	0	0	0	0	1	05	10
	Probability	1	1	0	0	0	05	
Total Marks		**16×1=16**	**2×4=08**	**10×2=20**	**7×3=21**	**3×5=15**	**80**	**80**

Atomic Energy Central School, Indore

MATHEMATICS (041)

Class: XI: Session: 2020-21

Time Allowed: 3hrs **Maximum Marks: 80**

General Instructions:

1. *This question paper contains two parts A and B. Each part is compulsory. Part-A carries 24 marks and Part-B carries 56 marks.*
2. *Part-A has Objective Type Questions and Part -B has Descriptive Type Questions*
3. *Both Part A and Part B have choices.*

Part -A:

1. *It consists of two sections I and II*
2. *Section I comprises of 16 very short answers type questions of 1 mark each.*
3. *Section II contains 2 case studies. Each case study comprises of 5 case-based MCQs. An examinee is to attempt any 4 out of 5 MCQs .*

Part -B:

1. *It consists of three sections- III, IV and V.*
2. *Section III comprises of 10 questions of 2 marks each.*
3. *Section IV comprises of 7 questions of 3 marks each.*
4. *Section V comprises of 3 questions of 5 marks each.*
5. *Internal choice is provided in 3 questions of Section III, 2 question of Section-IV and 3 questions of Section-V. You have to attempt only one of the alternatives in all such questions.*

Part – A

(Section -I: All questions are compulsory. In case of internal choices attempt any one.)

1) If f(x) = y = $\frac{ax-b}{cx-a}$ then find f(y).
2) Write domain & range of the function f(x) = 2 – |x – 5|.
3) $\frac{1-\tan^2 15°}{1+\tan^2 15°} =$ ______
4) Evaluate the value of sin50° – sin70° + sin10°
5) Write the multiplicative inverse of $3 + i\sqrt{7}$
6) If $\frac{3-i4}{3+i4} = x + iy$ then find the value of $x^2 + y^2$.
7) If |x + 2|≤ 9 then x∈…………
8) Solve 4x + 3 ≥ 2x + 17, 3x – 5 < –2.
9) A group consists of 4 girls & 7 boys. In how many ways can a team of 5 members be selected if the team has at least three girls?

Or

How many 2 digit odd numbers can be formed from the digits 1, 2, 3, 4, 5 if the digits is not repeated?

10) If T_n denotes the nth term of the series 2 + 3 + 6 + 11 + 18 + ... then T_{50} = ……………….
11) If sum of first n terms of an AP is $2n + 3n^2$ then write its nth term.
12) Find the equation of line passing through (1, 2) and making angle 30□ with Y axis.

Or

A line cuts intercept of –3 on Y axis and tangent at angle to the X axis is $\frac{3}{5}$ then find its equation.

13) Find a such that the distance between points (a, 0, 1) and (0, 1, 2) is $\sqrt{27}$.

Or

Find the ratio in which the line joining of the points (2, 4, 5) & (3, 5, –9) is divided by the yz- plane.

14) Evaluate $\frac{d}{dx}\left(\sqrt{\sqrt{x}-1}\right)$

15) Evaluate $\lim_{x\to 0}\frac{e^x - sinx - 1}{x}$

16) If A & B are mutually exclusive events, P(A) = 0.35 & P(B) = 0.45 the find P(A∩B′).

Or

While shuffling a pack of playing cards, 2 are accidently dropped. Find the probability that the missing cards to be different colours.

(Section -II: Attempt any four MCQs out of five MCQs given in the following two questions)

17) A man running a race course notes that the sum of the distances from the two flag posts from him is always 10 meters and the distance between the flag posts is 8 meters.

Based on the above information answer any four out five questions-

17.1) The equation conic followed by the man is
a) a circle b) a parabola c) an ellipse d) a hyperbola

17.2) The conic so obtained is
a) symmetrical about X axis b) symmetric about Y axis
c) symmetrical about both the axes c) none of these

17.3) Eccentricity of obtained conic is
a) 1 b) 4/5 c) 5/4 d) 0

17.4) Length of the latus rectum of the conic is
a) 18/5 b) 50/9 c) 10 d) 18

17.5) If the is at (2.5, k) at an instance the k =
a) $\mp\sqrt{3}/2$ b) $\mp\sqrt{3}/5$ c) $\mp 3\sqrt{3}/2$ d) $\mp 3\sqrt{3}/5$

18) Suppose that each child born is equally likely to be a boy or a girl. Consider a family with exactly three children.

Based on the above information answer any four out five questions-

18.1) The probability of exactly two girls in the family is
a) 1/8 b) 1/4 c) 3/8 d) 1/8

18.2) The probability of at least two girls in the family is
a) 1/2 b) 3/8 c) 1/2 d) 1/3

18.3) The probability of at most two girls in the family is
a) 7/8 b) 1/2 c) 1/8 d) 3/4

18.4) The probability that family has no girls child is
a) 1/8 b) 7/8 c) 1/4 d) 5/4

18.5) The probability that family has younger child is a girls
a) 1/2 b) 5/8 c) 1/4 d) 3/4

Part – B

(Section -III: All questions are compulsory. In case of internal choices attempt any one.)

19) If A = {1, 2, 3, 4, 5} and B = {1, 3, 9, 12} then find A∩B and hence show the information using Venn-Diagram.

20) If R = {(x, y) : y = 2x + 7, x∈ Z & −5 ≤ x ≤ 5} be a relation then find domain and range of R.

21) If $\sin\theta + \cos\theta = 1$ then find the value of $\sin 2\theta$.

22) Find the value of $\frac{1-\tan^2 15°}{1+\tan^2 15°}$

23) Evaluate $\left|(1+i)\frac{(2+i)}{(3+i)}\right|$

24) Find r such that ${}^nP_r = 840$ & ${}^nC_r = 35$. **Or** If ${}^{20}C_r = {}^{20}C_{r+4}$ then find the value of ${}^rC_3$.

25) If a, b, c, d are in G.P. then show that $(a^2 + b^2 + c^2)$, $(ab + bc + cd)$, $(b^2 + c^2 + d^2)$ are also in G.P.

26) Find the equations of the diagonals of square formed by the lines x = 0, y = 0, x = 1 & y = 1.

Or

If the sum of the distances of a moving point in a plane from the axes is 1 then find the locus of the point.

27) If A(3, 2, 0), B(5, 3, 2) & C(–9, 6, –3) are the vertices of a triangle ABC then find the length of the median AD.

28) Differentiate $\frac{ax+b}{px^2+qx+r}$ with respect to x. **Or** Evaluate $\lim_{x\to 1}\frac{\sqrt{5x-4}-\sqrt{x}}{x^2-1}$

(Section -IV: All questions are compulsory. In case of internal choices attempt any one.)

29) If A = {1, 2, 4, 5}, B = {2, 3, 5, 6} & C = {4, 5, 6, 7} then verify $A\cap(B\cup C) = (A\cap B)\cup(A\cap C)$

30) If $sinx = \frac{\sqrt{5}}{3}$ and $x \in \left(\frac{\pi}{2},\ \pi\right)$ then find the values of $sin\frac{x}{2}$ & $tan\frac{x}{2}$.

Or

Evaluate cos5x in terms of cosx.

31) If $(x+iy)^{1/3} = a + ib$ then find the values of $\frac{x}{a} + \frac{y}{b}$ & $\frac{x}{a} - \frac{y}{b}$.

Or

If z is a complex number such that |z| = 1 then show that $Re\left(\frac{z-1}{z+1}\right) = 0$.

32) In how many ways the letters of the word "ASSESSMENT" can be arranged. Hence find the ways

i) in which all S coming together.

ii) in which all S are not coming together.

33) If $\frac{a^{n+1}+b^{n+1}}{a^n+b^n}$ is arithmetic mean of a & b then find n.

34) Find two number whose arithmetic mean is 34 and geometric mean is 16.

35) Find the derivative of f(x) = xsinx using first principal.

(Section -V: All questions are compulsory. In case of internal choices attempt any one.)

36) In a town of 10,000 families it was found that 40% families buy newspaper A, 20% families buy newspaper B, 10% families buy newspaper C, 5% families buy A and B, 3% buy B and C and 4% buy A and C. If 2% families buy all the three newspapers. Find

i) the number of families which buy newspaper A only.

ii) the number of families which buy none of A, B and C.

iii) the number of families which buy only one newspaper.

Or

If A, B and C are three finite sets such that n(A) = 17, n(B) = 13, n(C) = 15, $n(A\cap B)=9$, $n(B\cap C)=4$, $n(C\cap A) = 5$, $n(A\cap B\cap C)=3$ and n(U) = 50 then find

i) $n(A\cap B'\cap C')$ ii) $n(A\cup B\cup C)$ iii) $n(A\cup B\cup C)'$

37) Solve the system of inequalities graphically: $x + 2y \le 10$, $x + y \ge 1$, $x - y \le 0$, $x \ge 0$, $y \ge 0$.

Or

A solution of 9% acid is to be diluted by adding 3% acid solution to it. The resulting mixture is to be more than 5% but less than 7%. If there is 460 liters of 9% solution then how many liters of 3% solution will have to be added?

38) The weight of coffee in 70 jars is shown in the following table:

Weight (gm)	200-201	201-202	202-203	203-204	204-205	205-206
Frequency	13	27	18	10	1	1

Determine the mean, variance and standard deviation of the above distribution.

Or

The following are the marks obtained out of 100 by two students Ravi and Hashima in 10 tests

Ravi	25	50	45	30	70	42	36	48	34	60
Hashima	10	70	50	20	95	55	42	60	48	80

Who is more consistent?

Answers

Q. No.	Answer	Q. No.	Answer
1	x	19	$A \cap B = \{1, 3\}$
2	Domain = R & Range = $(-\infty, 2]$	20	Domain=$\{-5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5\}$ Range= $\{-3, -1, 1, 3, 5, 7, 9, 11, 13, 15, 17\}$
3	$\frac{\sqrt{3}}{2}$	21	0
4	0	22	$\sqrt{3}/2$
5	$\frac{3}{16} - i\frac{\sqrt{7}}{16}$	23	1
6	1	24	4 **Or** 56
7	$[-11, 7]$	25	-
8	$(-\infty, 1) \cup [7, \infty)$	26	$y = x$ & $x + y = 1$ **Or** $\lvert x\rvert + \lvert y\rvert = 1$
9	91 **Or** 12	27	$\sqrt{126}/2$
10	$49^2 + 2 = 2403$	28	$\frac{dy}{dx} = \frac{-3apx^2-2pbx+ar-bq}{(px^2+qx+r)^2}$ **Or** 1
11	$T_n = 6n - 1$	29	-
12	$\sqrt{3}x - y + 2 - \sqrt{3} = 0$ **Or** $3x - 5y - 15 = 0$	30	$\frac{1}{\sqrt{6}}$ & $\frac{1}{\sqrt{5}}$ **Or** $16\cos^5 x - 20\cos^3 x + 5\cos x$
13	± 5 **Or** 2: 3(external division)	31	$4(a^2 - b^2)$ & $-2(a^2 + b^2)$
14	$\frac{1}{4\sqrt{x}\sqrt{\sqrt{x}-1}}$	32	75600 i) 2520 ii) 73080
15	0	33	$n = 1$
16	0.35 **Or** 26/51	34	$a = 64$ & $b = 4$
17.1	c	35	-
17.2	c	36	i) 3300 ii) 4000 iii) 5200 **Or** i) 6 ii) 30 iii) 20
17.3	b	37	Graph is on page 7 **Or** Between 230 lts & 920lts.
17.4	a	38	Mean = 201.98gm, variance = 1.16gm, SD = 1.08gm **Or** Ravi is more consistent than Hashima.
17.5	c		
18.1	c		
18.2	c		
18.3	a		
18.4	a		
18.5	a		

37. commons shaded portion is required solution.