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Answer Sheet No._____

Sign. of Candidate_____

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MATHEMATICS SSC–I (3rd Set)

(Science Group) (Curriculum 2006)

SECTION – A (Marks 15)

Time allowed: 20 Minutes

Section – A is compulsory. All parts of this section are to be answered on this page and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. **Do not use lead pencil.**

Q.1 Fill the relevant bubble for each part. All parts carry one mark.

(1) If $A = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ then value of A^2 is:

A. $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ ◯ B. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ ◯

C. $\begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix}$ ◯ D. $\begin{bmatrix} 0 & 0 \\ 1 & 1 \end{bmatrix}$ ◯

(2) Imaginary part of $-i(3i + 2)$ is:

A. -3 ◯ B. 3 ◯

C. -2 ◯ D. 2 ◯

(3) For what value of x, $\sqrt[3]{3x - 5} = \sqrt[3]{x + 1}$?

A. 3 ◯ B. 6 ◯

C. 3^3 ◯ D. 6^3 ◯

(4) If $4x = \log_2 64$ then value of x is:

A. 32 ◯ B. 21 ◯

C. 16 ◯ D. -16 ◯

(5) What is the value of 'x' in $(3x)^3 = 27$?

A. 0 ◯ B. 1 ◯

C. 3 ◯ D. 4 ◯

(6) Which one of the following is not a polynomial?

A. $3x + 8$ ◯ B. $x^2 + 2x + \sqrt{2}$ ◯

C. $x^2 + 2x + \sqrt{2x}$ ◯ D. $x^2 + 2x + \sqrt{2}x$ ◯

(7) The number of zeroes of the polynomial $x^3 + x - 3 - 3x^2$ are:

A. 0 ◯ B. 1 ◯

C. 2 ◯ D. 3 ◯

(8) What is the product of two polynomials, if their HCF is $(x - 1)$ and their LCM is $(x^2 - 2x + 1)$?

A. $(x-1)^3$ ◯ B. $(x-1)^2$ ◯

C. $x - 1$ ◯ D. $x^3 + 1$ ◯

(9) What is the solution set of $|x + 5| = -2$?

A. $\{-7, -3\}$ ◯ B. $\{7, 3\}$ ◯

C. $\emptyset$ ◯ D. 7 ◯

(10) The perpendicular distance of the point $P(3, 4)$ from $y - axis$ is:

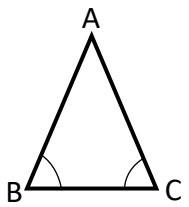
A. 0 ◯ B. 3 ◯

C. 4 ◯ D. 7 ◯

(11) What is the length of $m\overline{AB}$ in ΔABC, if $m\angle B = m\angle C$, $m\overline{BC} = 3cm$ and $m\overline{AC} = 4cm$?

A) 3 ◯ B) 4 ◯

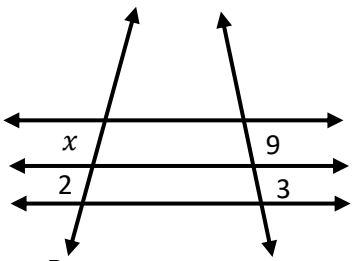
C) 5 ◯ D) 6 ◯



(12) What is the value of x in the adjoining figure?

A. $\frac{2}{3}$ ◯ B. 3 ◯

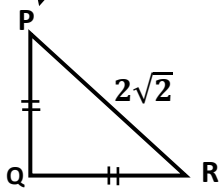
C. 6 ◯ D. $\frac{27}{2}$ ◯



(13) What is the length of $\overline{QR}$ in ΔPQR, if $\overline{PR} = 2\sqrt{2}$ and $\overline{PQ} = \overline{QR}$?

A. 2 ◯ B. $\sqrt{2}$ ◯

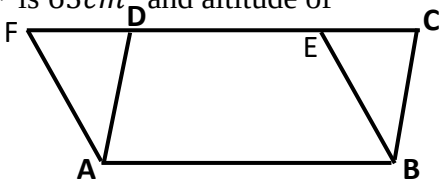
C. $\sqrt{8}$ ◯ D. 4 ◯



(14) What is the length of $\overline{AB}$, if area of parallelogram $ABEF$ is $63cm^2$ and altitude of parallelogram $ABCD$ is $7cm$.

A. $3cm$ ◯ B. $9cm$ ◯

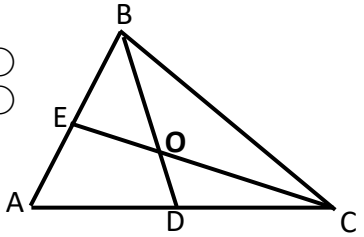
C. $18cm$ ◯ D. $27cm$ ◯



(15) $\overline{BD}$, $\overline{CE}$ are two medians of the triangle ABC. If $\overline{EO} = 7cm$, then what is the length of $\overline{CE}$?

A. $(7 \times 1)cm$ ◯ B. $(7 \times 2)cm$ ◯

C. $(7 \times 3)cm$ ◯ D. $(7 \times 4)cm$ ◯



Federal Board SSC-I Examination
Mathematics Model Question Paper
(Science Group) (Curriculum 2006)

Time allowed: 2.40 hours | Total Marks: 60

Note: Attempt any nine parts from Section 'B' and any three questions from Section 'C' on the separately provided answer book. Write your answers neatly and legibly. Log book will be provided on demand.

SECTION – B (Marks 36)

Q.2 Attempt any **NINE** parts from the following. All parts carry equal marks. $(9\times4 = 36)$

i. If $A = \begin{bmatrix}1 & 2\\ 1 & 3\end{bmatrix}$ and $I = \begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$ then

a. Find $(detA)$ and $(adjA)$

b. Show that $A(adjA) = (adjA)A = (detA)I$

ii. Find the values of x and y if $(x - iy)(3 + 5i)$ is the conjugate of $(-6 - 24i)$

iii. Find the value of n: $\log_4(64)^{n+1} = \log_5(625)^{n-1}$

iv. If $\frac{1}{x} = \sqrt{7} + \sqrt{6}$ then find the values of $\left(x + \frac{1}{x}\right)$, $\left(x - \frac{1}{x}\right)$ and $\left(x^2 - \frac{1}{x^2}\right)$.

v. Determine that whether $(x + 3)$ is a factor of $P(x) = x^4 - 2x^3 - 11x^2 - 8x - 60$? If so, factor $P(x)$ completely.

vi. Find a polynomial similar to $x^2 - 5x - 14$, such that their HCF is $(x - 7)$ and LCM is $\left(x^3 - 10x^2 + 11x + 70\right)$

vii. $\left|\frac{3x+9}{2x+1}\right| - 9 = 5$ where $x \in \mathcal{R}$

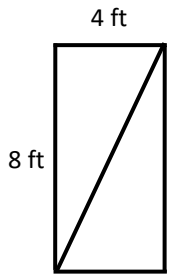
viii. Solve $\frac{2}{3} \leq \frac{1+x}{6} \leq \frac{3}{4}$ where $x \in \mathcal{R}$

ix. Solve the following system of linear equations graphically.

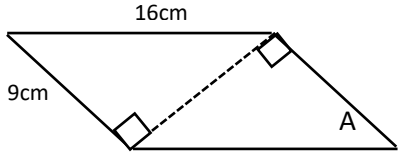
$x + 2y = -4$; $2x + 4y = 8$

x. Check whether the points $P(3, 3)$, $Q(8, 3)$ and $R(3, 12)$ are collinear or not.

xi. Can a table 9 feet wide (legs folded) fit through a rectangular doorway 4 feet by 8 feet? Use Pythagoras theorem to decide.



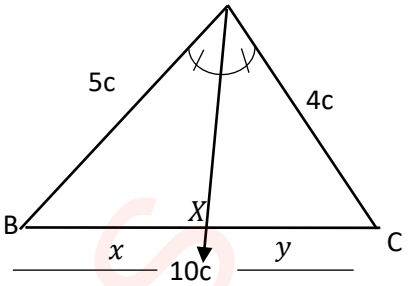
xii. Find area of the parallelogram shown in the figure.



xiii. In ΔABC (shown in the figure), $\overline{AX}$ bisects $\angle A$.

If $m\overline{AC} = 4cm$, $m\overline{AB} = 5cm$ and $m\overline{BC} = 8cm$

Find the values of x and y.



xiv. Prove that any point inside an angle, equidistant from its arms, is on the bisector of it.

SECTION-C (24Marks)

Note: Attempt any **THREE** questions. All questions carry equal marks. (3 × 8 = 24)

Q.3 If $A = \begin{bmatrix} 3 & 4 \\ 2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 7 \\ 2 & 5 \end{bmatrix}$ then show that $(AB)^{-1} = B^{-1}A^{-1}$.

Q.4 Prove that $\frac{x}{x^2-x-2} - \frac{1}{x^2+5x-14} - \frac{2}{x^2+8x+7} = \frac{x+3}{x^2+5x-14}$

Q.5 Prove that from a point, outside a line, the perpendicular is the shortest distance from the point to the line.

Q.6 Prove that a line parallel to one side of a triangle and intersecting the other two sides divides them proportionally.

Q.7 a. Construct a square equal in area to a rectangle whose adjacent sides are 4cm and 2cm.

b. Calculate the side measure of the square and its area.

c. Compare area of the square with the area of rectangle.

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MATHEMATICS SSC-I (3rd Set)

Student Learning Outcomes Alignment Chart

(Curriculum 2006)

Sec-A	Q1	Contents and Scope	Student Learning Outcomes
	i	1.4 Multiplication of Matrices	ii) Multiply two or three matrices.
	ii	2.6 Basic Operations on Complex numbers	Carryout basic operations on complex numbers.
	iii	2.3 Radicals and Radicands	iii) Transform an expression given in radical form to an exponential form and vice versa.
	iv	3.2 Logarithm	i) Define logarithm of a number to the base a as the power to which a must be raised to give the number i.e. ($a^x = y \Leftrightarrow log_a y = x$, $a > 0, y > 0$ and $a \neq 1$)
	v	3.2 Logarithm	i) Define logarithm of a number to the base a as the power to which a must be raised to give the number i.e. ($a^x = y \Leftrightarrow log_a y = x$, $a > 0, y > 0$ and $a \neq 1$)
	vi	4.1 Algebraic Expressions	iii) Examine whether a given algebraic expression is a • Polynomial or not, • Rational expression or not.
	vii	5.2 Remainder Theorem and Factor Theorem	iii) Define zeros of a polynomial.
	viii	6.1 Highest Common Factor and Least Common Multiple	iii) Know the relationship between HCF and LCM.
	ix	7.2 Equation involving Absolute Value	ii) Solve the equation, involving variable.
	x	14.1 Cartesian plane and Linear Graph	vii) Construct a table for pairs of values satisfying a linear equation in two variables.
	xi	17.1 Congruent Triangles	ii) If two angles of a triangle are congruent then the sides opposite to them are also congruent.
	xii	18.1 Parallelograms and Triangles	v) If three or more parallel lines make congruent intercepts on a transversal they also intercept congruent segments on any other line that cuts them.
	xiii	22.1 Pythagoras' Theorem	i) In a right-angled triangle, the square of the length of hypotenuse is equal to the sum of the squares of the lengths of the other two sides.
	xiv	23.1 Theorems Related with Area.	i) Parallelogram on the same base and lying between the same parallel lines (or of the same altitude) are equal in area.
	xv	29.1 Construction of Triangle	ii) Draw perpendicular bisectors medians of a given triangle and verify their concurrency.

Sec-B	i	1.5 Multiplicative Inverse of a Matrix 1.4 Multiplication of Matrices	ii) Evaluate determinant of a matrix iv) Define Adjoint of a matrix. ii) Multiply two or three matrices. vi) Define multiplicative identity of a matrix.
	ii	2.5 Complex Numbers 2.6 Basic Operations on Complex numbers	iii) Define conjugate of a complex number. iv) Know the condition for equality of complex numbers. Carryout basic operations on complex numbers.

	iii	3.5 Application of Logarithm	Apply laws of logarithm to convert lengthy processes of multiplication, division, and exponentiation into easier processes of addition and subtraction etc.
	iv	4.1 Algebraic Expressions	vii) Find the sum, difference and product of rational expressions.
	v	5.3 Factorization of a cubic polynomial.	Use Factor Theorem to factorize a cubic polynomial.
	vi	6.1 Highest Common Factor and Least Common Multiple	iii) Know the relationship between HCF and LCM.
	vii	7.2 Equation involving Absolute Value	ii) Solve the equation, involving absolute value in one variable.
	viii	7.4 Solving Linear Inequalities.	Solve Linear inequalities with rational coefficients.
	ix	14.3 Graphic Solution of Equations in Two variables	Solve simultaneous linear equations in two variables using graphical method.
	x	15.2 Collinear Points	ii) Use distance formula to show that (given two or more) points are collinear.
	xi	22.1 Pythagoras' Theorem	i) In a right-angled triangle, the square of the length of hypotenuse is equal to the sum of the squares of the lengths of the other two sides.
	xii	18.1 Parallelograms and Triangles	i) In a parallelogram: • the opposite sides are congruent, • the opposite angles are congruent, • the diagonals bisect each other.
	xiii	21.1 Ratio and Proportion	iii) The internal bisector of an angle of a triangle divides the side opposite to it in the ratio of the lengths of the sides containing the angle.
	xiv	19.1 Line Bisectors and Angle Bisectors	v) Any point inside an angle, equidistant from its arms, is on the bisector of it.
Sec-C	Q 3	1.5 Multiplicative Inverse of a Matrix	vii) Verify the result $(AB)^{-1} = B^{-1}A^{-1}$
	Q 4	6.2 Basic Operations on Algebraic Fractions	Use highest common factor and least common multiple to reduce fractional expressions involving $+, -, \times, \div$.
	Q 5	20.1 Sides and Angles of a Triangle	iv) From a point, out-side a line, the perpendicular is the shortest distance from the point to the line.
	Q 6	21.1 Ratio and Proportion	i) A line parallel to one side of a triangle, intersecting the other two sides, divides them proportionally.
	Q 7	29.2 Figures with Equal Areas	iii) Construct a square equal in area to a given rectangle.

MATHEMATICS SSC-I (3rd Set)

Table of Specification

Topics	1. Matrices and Determinants	2. Real and Complex Numbers	3. Logarithms	4. Algebraic Expressions & Algebraic Formulas	5. Factorization	6. Algebraic Manipulation	7. Linear Equations and Inequalities	8. Linear Graphs and Their Application	9. Introduction to Coordinate Geometry	10. Congruent Triangles	11. Parallelograms and Triangles	12. Line Bisectors and Angle Bisectors	13. Sides and Angles of a Triangle	14. Ratio and Proportion	15. Pythagoras 'Theorem	16. Theorems Related with Area	17. Practical Geometry Triangles	Total marks for each assessment objective	% age
Knowledge based	**1(1)(1) 2 *i* (4)**		**1(5) (1)**	**1(6) (1)**	**1(7) (1)**	**1 *viii* (1) 2 *vi* (4)**						**2 *xiv* (4)**	**5 (8)**	**6 (8)**	**2 *xi* (2)**			**35**	**31.5%**
Comprehension based	**3 (8)**	**1(2) (1) 1 (3) (1) 2 *ii* (4)**	**1(4) (1) 2 *iii* (2)**	**2 *iv* (4)**	**2 *v* (4)**	**4 (8)**	**1(9) (1) 2 *vii* (4) 2 *viii* (4)**		**1(10)(1 2 *x* (4)**		**1(12) (1) 2 *xii* (4)**						**1(15)(1)**	**53**	**47.7%**
Application based			**2 *iii* (2)**					**2 *ix* (4)**		**1(11)(1)**				**2 *xiii*(4**	**1(13)(1) 2 *xi* (2)**	**1 *xiv* (1)**	**7 (8)**	**23**	**20.7%**
Total marks for each topic	**13**	**06**	**06**	**05**	**05**	**13**	**09**	**04**	**05**	**01**	**05**	**04**	**08**	**12**	**05**	**01**	**09**	**111**	**100%**

KEY:

1(1)(01)

Question No (Part No.) (Allocated Marks)

Note: (i) The policy of FBISE for knowledge based questions, understanding based questions and application based questions is approximately 30% knowledge based, 50% understanding based,20% application based.

(ii)The total marks specified for each unit/content in the table of specification is only related to this model question paper.

(iii) The level of difficulty of the paper is approximately 40% easy, 40% moderate,20% difficult.