

Version No.			

ROLL NUMBER						



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Answer Sheet No. _____

Sign. of Candidate _____

Sign. of Invigilator _____

MATHEMATICS SSC-II (2nd Set)

(Science Group) (Curriculum 2006)

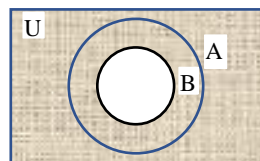
SECTION – A (Marks 15)

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) Solution of quadratic equation $3x^2 + 2x - 8 = 0$:
- A. $\{2, -\frac{4}{3}\}$ B. $\{-2, \frac{4}{3}\}$
- C. $\{-2, -\frac{4}{3}\}$ D. $\{2, \frac{4}{3}\}$
- (2) Cube roots of -125 are:
- A. $-5, -5w, -5w^2$ B. $5, 5w, -5w^2$
- C. $-5, -5w, 5w^2$ D. $5, -5w, 5w^2$
- (3) If 8cm long two chords subtends a central angle of 60° , then the radius of the circle is :
- A. 1 B. 2
- C. 4 D. 8
- (4) If $21:7 :: 4:3a + 1$ then what is 4th proportional?
- A. 9 B. $\frac{3}{4}$
- C. $\frac{4}{3}$ D. $\frac{1}{9}$
- (5) Which one of the following represent the shaded region in the given figure?
- A. A'
- B. B'
- C. $A \cup A'$
- D. $A \cup B'$



- (6) If $X=\{0,1,2\}$, $Y=\{-1,0,2\}$, then the bijective function is :
- A. $\{(0,2),(1,2),(2,-1)\}$
- B. $\{(0,2),(1,-1),(2,-1)\}$
- C. $\{(1,-1),(2,0),(0,0)\}$
- D. $\{(2,0),(0,2),(1,-1)\}$

- (7) Partial fraction of $\frac{1}{(x^2-1)(x^2+1)}$ are given by:
- A. $\frac{A}{(x-1)} + \frac{B}{(x+1)} + \frac{Cx+D}{(x^2+1)}$ B. $\frac{A}{(x-1)} - \frac{B}{(x+1)} + \frac{Cx+D}{(x^2+1)}$
- C. $\frac{A}{(x-1)} + \frac{B}{(x+1)} - \frac{Cx+D}{(x^2+1)}$ D. $\frac{A}{(x-1)} - \frac{B}{(x+1)} - \frac{Cx+D}{(x^2+1)}$

- (8) Range of the data 115, 121, 84, 89, 77 is:
- A. 38 B. 37
- C. 30 D. 44

- (9) An arithmetic mean of 35, 35, 35, 35, 35 is :
- A. 175 B. 35
- C. 5 D. 0

- (10) If $\tan \theta = \sqrt{3}$, then θ is equal to:
- A. 90° B. 60°
- C. 45° D. 30°

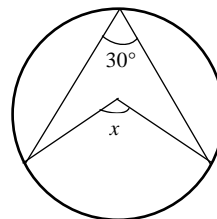
- (11) $\frac{1}{1+\cos \theta} + \frac{1}{1-\cos \theta}$ is:
- A. $2\sec^2 \theta$ B. $2\operatorname{cosec}^2 \theta$
- C. $2\cos^2 \theta$ D. $2\sin^2 \theta$

- (12) If angle subtended by an arc of radius 'r' is θ then what is length of arc?
- A. $r\theta$ B. θ/r
- C. r/θ D. θr^2

- (13) If Two chords \overline{AB} and \overline{XY} are equidistant from the centre, then these are:
- A. Collinear
- B. Congruent
- C. Non-congruent
- D. Perpendicular

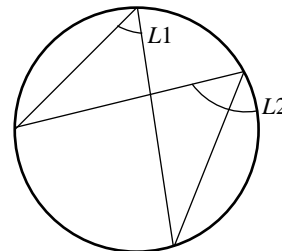
- (14) In the figure, the central angle x of the circle is :

- A. 120°
- B. 90°
- C. 60°
- D. 30°



- (15) If $m\angle 1 = 50^\circ$ in the given figure, then $m\angle 2$ is:

- A. 25°
- B. 50°
- C. 100°
- D. 150°





Federal Board SSC-II 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. ($9 \times 4 = 36$)

- i. If $x-2$ and $x+2$ are the factors of the polynomial $P(x) = x^3 - 4mx^2 - 2nx + 1 = 0$, then find the values of m and n .
- ii. Solve the equation $2x^{-2} - 21 = x^{-1}$
- iii. Find x and y if $(7-5x, 3y+2) = (y+1, x-2)$
- iv. Prove that two tangent drawn to a circle from a point outside it, are equal in length.
- v. Two equal circles of each radius 3.5cm and their centres are 8cm apart. Draw two circles and their transverse common tangents.
- vi. If α, β are the roots of $4z^2 + 17z + k = 0$, satisfying the condition $2\alpha + 3\beta = 35$, then find the value of k .
- vii. Find the length of a chord which stands at a distance 7cm from the centre of a circle with radius 12cm.
- viii. A tree is of height 24 fts. If the angle of elevation of Sun is 40° , find the length of its shadow by drawing the figure.
- ix. Resolve $\frac{x^3}{x^2-x-2}$ into partial fractions.
- x. If x is inversely proportional to y and directly proportional to z and t when $x=8$, $y=\frac{7}{2}$, $z=14$, $t=5$. Find the value of t if $x=20$, $y=\frac{9}{2}$, $z=23$.
- xi. If $A = \{1, 2, 3, 4\}$, $B = \{5, 6, 8\}$
 - a. Find $A \times B$
 - b. Write the relation $R = \{(x, y) \mid y = 2x\}$
 - c. Write domain and range of the relation R
- xii. Find $m\overline{XZ}$ if in ΔXYZ , $m\overline{XY} = 8\sqrt{2}cm$, $m\overline{YZ} = 12cm$ and $m\angle XYZ = 135^\circ$.
- xiii. Prove that the area of sector of a circle is $\frac{1}{2}r^2\theta$, where r is the radius and θ is the central angle of the circle.
- xiv. Calculate the simple moving average of 5 years from the following data of attendance of class 10th of a school:

Month	Jan	Feb	Mar	Apr	May	June	Jul	Aug
attendance	70	82	85	85	83	78	75	80

SECTION – C (Marks 24)

Note: Attempt any **THREE** questions. Each question carries equal marks. (3 × 8 = 24)

Q.3 If $U = \{1, 2, 3, \dots, 20\}$, $A = \{2, 4, 6, \dots, 20\}$, $B = \{2, 3, 5, \dots, 19\}$, then prove the De-Morgan's Laws.

Q.4 Solve the following system of equations:

$$a^2 + b^2 = 20 ; \quad 3a^2 - 2ab - b^2 = 0$$

Q.5 Prove that;

(i) $(\tan\theta + \cot\theta)(\cos\theta + \sin\theta) = \sec\theta + \csc\theta$

(ii) $\frac{\cos\theta - \sin\theta}{\cot^2\theta - 1} = \frac{\sin^2\theta}{\cos\theta + \sin\theta}$

Q.6 Find the roots and extraneous roots of the following equation.

$$\sqrt{x^2 + 3x + 5} + \sqrt{x^2 + 3x - 2} = 7$$

Q.7 Prove that the opposite angles of any quadrilateral inscribed in a circle are supplementary.

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MATHEMATICS SSC-II (2nd Set)
Student Learning Outcomes Alignment Chart
 (Curriculum 2006)

Sec-A	Q 1	Contents and Scope	Student Learning Outcomes *
	(1)	8.2 Solution of Quadratic Equations	Solve a quadratic equation in one variable by <ul style="list-style-type: none"> • factorization, • completing square.
	(2)	9.2 Cube Roots of Unity and their Properties	iv. Use properties of cube roots of unity to solve appropriate problems.
	(3)	27.1 Chords and Arcs	iii. Equal chords of a circle (or of congruent circles) subtended at the Centre(at the corresponding centres).
	(4)	10.1 Ratio, Proportions and Variations	ii. Find 3 rd , 4 th mean and continued proportion.
	(5)	12.1.3 Venn Diagram	vi. Use Venn diagram to represent <ul style="list-style-type: none"> • union and intersection of sets, • complement of a set.
	(6)	12.3 Function	i. Define function and identify its domain, co-domain and range. iii. Demonstrate the following: <ul style="list-style-type: none"> • into function, • one-one function, • into and one-one function (injective function), • onto function (surjective function), • one-one and onto function (bijective function).
	(7)	11.2 Resolution of Fraction into Partial Fractions	Resolve an algebraic fraction into partial fractions when its denominator consists of <ul style="list-style-type: none"> • non-repeated linear factors, • non-repeated quadratic factors,
	(8)	13.4 Measures of Dispersion	Measure range, variance and standard deviation.
	(9)	13.3 Measures of Central Tendency	i. Calculate (for ungrouped and grouped data): <ul style="list-style-type: none"> • arithmetic mean by definition
	(10)	16.3 Trigonometric Ratios	iv. Recall the values of trigonometric ratios for 45°, 30°, 60°.
	(11)	16.4 Trigonometric Identities	Prove the trigonometric identities and apply them to show different trigonometric relations.
	(12)	16.2 Sector of a Circle	i. Establish the rule $l = r\theta$, where r is the radius of the circle, l the length of circular arc and θ the central angle measured in radians.
	(13)	25.1 Chords of a Circle	v Two chords of a circle which are equidistant

			from the centre are congruent.
	(14)	28.1 Angle in a Segment of a Circle	i. The measure of a central angle of a minor arc of a circle, is double that of the angle subtended by the corresponding major arc.
	(15)	28.1 Angle in a Segment of a Circle	ii. Any two angles in the same segment of a circle are equal.
Sec B	Q2		
	i.	9.6 Synthetic Division	i. Use synthetic division to find the values of unknowns if the factors of a polynomial are given.
	ii.	8.4 Equations Reducible to Quadratic Form	iv. Solve exponential equations in which the variables occur in exponents.
	iii.	12.3 Function	ii. Demonstrate the following: <ul style="list-style-type: none"> • into function, • one-one function, • into and one-one function (injective function), • onto function (surjective function), • one-one and onto function (bijective function).
	iv.	26.1 Tangent to a Circle	iii. The two tangent drawn to a circle from a point outside it, are equal in length..
	v.	30.3 Tangent to the Circle	iv. Draw transverse common tangent or internal tangent to two equal circles.
	vi.	9.2 Cube Roots of Unity and their Properties	ii. Recognize complex cube roots of unity as w and w^2 . iii. Prove the properties of cube roots of unity. iv. Use properties of cube roots of unity to solve appropriate problems.
	vii.	25.1 Chords of a circle	ii. straight line ,drawn from the Centre of a circle to bisect a chord(which is not a diameter) is perpendicular to the chord iii Perpendicular from the Centre of a circle on the chord bisect it.
	viii.	16.5 Angle of Elevation and Depression.	ii. Solve real life problems involving angle of elevation and depression.
	ix.	11.2 Resolution of Fraction into Partial Fractions	Resolve an algebraic fraction into partial fractions when its denominator consists of <ul style="list-style-type: none"> • non-repeated linear factors,
	x.	10.3 Joint Variation	ii. Solve problems related to joint variation.
	xi.	12.1.2 Ordered pairs and Cartesian Product 12.2 Binary relation	viii. Recognize ordered pairs and Cartesian Product . Define binary relation and identify its domain and range

	xii.	24.1 Projection of a Side of a Triangle	<p>Prove the following theorems along with corollaries and apply them to solve appropriate problems.</p> <p>i) In an obtuse-angled triangle, the square on the side opposite to the obtuse angle is equal to the sum of the squares on the sides containing the obtuse angle together with twice the rectangle contained by one of the sides, and the projection on it of the other.</p>
	xiii.	16.2 Sector of a Circle	ii. Prove that the area of a sector of a circle is $\frac{1}{2}r^2\theta$
	xiv.	13.3 Measures of Central Tendency	iii. Calculate weighted mean and moving averages.
Sec C			
	Q.3	12.1.2 Properties of Union and Intersection	<p>iv) Give formal proofs of the following fundamental properties of union and intersection of two or three sets.</p> <ul style="list-style-type: none"> • Commutative property of union, • Commutative property of intersection, • Associative property of union, • Associative property of intersection, • Distributive property of union over intersection, • Distributive property of intersection over union, • De Morgan's laws. <p>v) Verify the fundamental properties for given sets.</p>
	Q.4	9.7 Simultaneous Equations	<p>Solve a system of two equations in two variables when</p> <ul style="list-style-type: none"> • one equation is linear and the other is quadratic, • both the equations are quadratic.
	Q.5	16.4 Trigonometric Identities	Prove the trigonometric identities and apply them to show different trigonometric relations.
	Q.6	8.5 Radical Equations	<p>Solve equations of the type:</p> <ul style="list-style-type: none"> • $\sqrt{ax + b} = cx + d$, • $\sqrt{x + a} \sqrt{x + b} = \sqrt{x + c}$, • $\sqrt{x^2 + px + m} + \sqrt{x^2 + px + n} = q$.
	Q.7	28.1 Angle in a Segment of a Circle	iv. The opposite angles of any quadrilateral inscribed in a circle are supplementary.

MATHEMATICS SSC-II (2nd Set)

Table of Specification

Topics	8. Quadratic Equations	9. Theory of Quadratic Equations	10. Variations	11. Partial Fractions	12. Sets and Functions	13. Basic Statistics	16. Introduction to Trigonometry	24. Projection of a Side of a Triangle	25. Chords of a Circle	26. Tangent to a Circle	27. Chords and Arcs	28. Angle in a Segment of a Circle	30. Practical Geometry Circles	Total marks for each assessment objective	% age
Knowledge based					2 xi (4) 3 (8)	2 xiv (4)	1 (12) (1) 2 xiii (4)		1 (13) (1)	2 iv (4)		7 (8)		34	30.6%
Understanding based	1 (1) (1) 2 ii (4) 6 (8)	1 (2) (1) 2 i (4) 2 vi (4) 4 (8)	1 (4) (1) 2 x (4)	1 (7) (1) 2 ix (4)	2 iii (4) 1 (6) (1)	1 (8) (1) 1 (9) (1)	1 (10) (1)		2 vii (4)		1 (3) (1)	1 (15) (1) 1 (14) (1)		55	49.5%
Application based					1 (5) (1)		1 (11) (1) 2 viii (4) 5 (8)	2 xii (4)					2 v (4)	22	19.8%
Total marks for each topic	13	17	5	5	18	6	19	4	1	4	1	10	4	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 as follows:

- a) 30% knowledge based.
- b) 50% understanding based.
- c) 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 as follows:

- a) 40% easy
- b) 40% moderate
- c) 20% difficult