		CR	MBE	NUI	OLL	R		0.	on No	ersi	V
	0	0	0	0	0	0	0	0	0	0	0
	1	1	1	1	1	1	1	1	1	1	1
	2	2	2	2	2	2	2	2	2	2	2
 Answer Sheet No	3	3	3	3	3	3	3	3	3	3	3
	4	4	4	4	4	4	4	4	4	4	4
Sign. of Candidate_	5	5	5	5	5	5	(5)	5	5	5	5
	6	6	6	6	6	6	6	6	6	6	6
	7	7	7	7	7	7	$\overline{7}$	$\overline{\mathcal{O}}$	7	7	7
 Sign. of Invigilator_	8	8	8	8	8	8	8	8	8	8	8
	9	9	9	9	9	9	9	9	9	9	9

(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)	Cance	Ellation of x on both si	des of 6	$x^2 = 2$	1x means:	
	Α. ΄	The loss of one root	0	B.	No loss of any root	\bigcirc
	С. 7	The gain of one root	0	D.	Undefined solution	\bigcirc
(2)	If b^2 ·	-4ac > 0 is a perfect	square	then roo	ots of $ax^2 + bx + c =$	0 are
	A.	Irrational, Equal	\bigcirc	B.	Rational, Equal	\bigcirc
	C.	Rational, Unequal	\bigcirc	D.	Irrational, Unequal	\bigcirc
(3)	On si	mplifying $(7 + 5\omega + 1)$	$(5\omega^2)^2$ w	ve get:		
	A.	4	\bigcirc	B.	12	\bigcirc
	C.	17	\bigcirc	D.	144	\bigcirc
(4)	If y^2 v	varies inversely as x^3 t	hen:			
	A.	$y^2 = k x^3$	\bigcirc	B.	$y^2 = \frac{k}{x^3}$	\bigcirc
	C.	$\frac{y^2}{x^3} = 1$	\bigcirc	D.	$y^2 x^3 = 1$	\bigcirc
(5)	Partia	l fractions of $\frac{x^2+1}{(x+1)(x-1)}$	$\frac{1}{2}$ are of	the form	n:	
	A.	$1 - \frac{A}{(x+1)} + \frac{B}{(x-1)}$	0	B.	$1 + \frac{A}{(x+1)} + \frac{B}{(x-1)}$	\bigcirc
	C.	$1 + \frac{A}{(x+1)} + \frac{Bx}{(x-1)}$	\bigcirc	D.	$\frac{A}{(x+1)} + \frac{B}{(x-1)}$	\bigcirc
(6)	If $A \cap$	$B = \emptyset$, then set A and	d B are:			
	A.	Subsets of each othe	r 🔿	B.	Overlapping sets	\bigcirc
	C.	Disjoint sets	\bigcirc	D.	Equal sets	\bigcirc
			Page 1 d	of 2		

(7)	If <i>f</i> : A. C.	$A \rightarrow B$ and range Into function Bijective function	of <i>f</i>	$\neq B$ the \bigcirc	en f is a B. D.	a/an: Onto function Injective function	00
(8)	If <i>Y</i> = A. C.	$= X + 5 then \overline{Y} = ?$ $\frac{\overline{X}}{\overline{X}} + 5$?	0	B. D.	$5 \over 5\overline{X}$	0
(9)	$\sum_{A.} (X - A.)$ C.	$(-\overline{X}) = ?$ (-1)		\bigcirc	B. D.	1 0	8
(10)	In wh A. C.	ich of the followir I III	ng qu	adrants	θ lies v B. D.	when $\sin \theta < 0$, $\sec \theta$ II IV	< 0? () ()
(11)	sec θ Α. C.	$\cot \theta = ?$ $\operatorname{cosec} \theta$ $\sin \theta$		00	B. D.	$ an heta \ heta \ $	0 0
(12)	What	is the value of m ,	if	= 15 an	d $\theta = \frac{\pi}{3}$	$\frac{\tau}{3}$?	
	A. C.	5π () 45π ()	\sum	B. D.	$\frac{\frac{\pi}{5}}{\frac{45}{\pi}}$		(θ) r m
(13)	What	is the length of ch	nord i	ntercept	ted at 4	cm away from the cer	tre of the circle?
	A. C.	4cm 7cm		B. D.	6cm 9cm	O A Scm	B C Scm B B C C Scm B C C Scm C Scm C Scm C Scm C Scm C Scm C Scm Scm Scm Scm Scm Scm Scm Scm
(14)	If DC	$\ \overline{AB} \text{ and } \angle AOC$	= 10	00° (in t	the figu	re), then $\angle ACD = ?$	
(15)	A. C. In the	30° 50° adjoining figure,	lengt	B. D. h of the	40° 60° escribe	$\bigcirc_{A} \bigwedge_{C} A$	B B
	A.	a (\supset	B.	2a	0	a a a a a a a a a a a a a a a a a a a
	C.	3a (\supset	D.	$\frac{1}{2}a$	- 0 \	0

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

Time allowed: 2.40 hours

Total Marks: 60

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C

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Attempt any nine parts from Section 'B' and any three questions from Section 'C' on the Note: 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. $(9 \times 4 = 36)$
 - Apply quadratic formula to solve the equation $\frac{2x+1}{x+2} \frac{2x+4}{2x+8} = 0$ Find the value of *x*: $3 \cdot 3^{2x+1} 10 \cdot 3^x + 1 = 0$ i.
 - ii.
 - If θ and φ are the roots of $y^2 7y + 9 = 0$. Form an equation whose roots are 2θ iii. and 2φ .
 - The length of a rectangle is 5cm more than its breadth. If the area of the rectangle iv. is 50cm^2 , find its length and breadth.
 - Find the fourth proportional to: $(x^3 y^3)$, $(x^2 y^2)$, $(y^2 + 2xy + y^2)$ v.
 - The current I in a wire varies directly as electromotive force E, and inversely as vi. resistance R. If I = 32 amperes, when E = 1280 volts and R = 80 ohms, what will be the value of I when E = 1500 volts and R = 180 ohms?

vii. Resolve
$$\frac{4x+2}{2(x-1)(x^2+1)}$$
 into partial fractions.

- If U = {1, 2, 3, ..., 20}, A = {1, 2, 3,...,10} and B = {2, 4, 6, 8, 10, 12, 14, 16}, viii. then find $(A \cup B) - (A \cap B)^c$
- The marks of four students in Mathematics are as follows. Determine Variance ix. and Standard Deviation.

Students	1	2	3	4
Marks	90	80	70	90

- If $\tan \theta = \frac{\sqrt{7}}{2}$, then find the values of other trigonometric ratios. x.
- Prove that, the perpendicular from the center of a circle on a chord bisects it. xi.
- \overrightarrow{PA} and \overrightarrow{PB} are tangents to the circle from an external point P. xii.

 \overline{CD} is another tangent touching the circle at E such that $m\overline{CE} = m\overline{DE} = 2cm.$

If $m\overline{PA} = 8cm$, $m\overline{OA} = 3cm$ then, find $m\overline{PC} + m\overline{PD}$.

xiii. In the adjoining figure, ABCD is a cyclic quadrilateral inscribed in a circle having centre at O. If $a = 30^\circ$, $d = 45^\circ$, then find the values of *b*, *c*, *e* and *f*.



 $(3 \times 8 = 24)$

xiv. Prove that, equal chords of a circle subtend equal angles at the centre.

SECTION-C (Marks-24)

NOTE: Attempt any three questions. All questions carry equal marks.

- **Q.3** Solve the equation: $x^4 4x^3 3x^2 + 4x + 1 = 0$
- Q.4 Verify De-Morgan's Laws for the following sets: $U = \{x | x \in N \land 5 \le x \le 20\}, A = \{x | x \in E \land 5 \le x \le 20\}, B = \{x | x \in P \land 5 \le x \le 20\}$
- **Q.5** For the following frequency distribution

Classes	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
f	3	4	5	6	7

a. Calculate Geometric Mean of the data.

b. Calculate Harmonic Mean of the data.

- Q.6 Circumscribe a regular hexagon about a circle of radius 5cm.
- **Q.7** In any triangle, the sum of the squares on any two sides is equal to twice the square on half the third side together with twice the square on the median which bisects the third side (Apollonius' Theorem).

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MATHEMATICS SSC-II (3rd Set) Student Learning Outcomes Alignment Chart Science Group (Curriculum 2006)

Sec-A	Q 1	Contents and Scope	Student Learning Outcomes
	i	8.2 Solution of Quadratic Equations	Solve a quadratic equation in one variable by factorization
	ii	9.1 Nature of the Roots of a	iii) Discuss the nature of roots of a quadratic equation through discriminant
	iii	9.2 Cube Roots of Unity	iv) Use properties of cube roots of
	111	and their Properties	unity to solve appropriate problems.
	iv	10.1 Ratio, Proportions and Variations	i) Define ratio, proportions and variations (direct and inverse).
		11.2 Resolution of Fraction	Resolve an algebraic fraction into
	v	into Partial Fractions.	partial fractions when its denominator
			consists of non-repeated linear factors.
		12.1.3 Venn Diagram	i) Use Venn diagram to represent
	vi		• union and intersection of sets.
			• complement of a set.
		12.3 Function	i) Demonstrate the following:
			 into function.
			• one-one function
			• into and one-one function
	vii		(injective function).
			• onto function (surjective function).
			• one-one and onto function
			(bijective function).
		13.3 Measures of Central Tendency	ii) Recognize properties of arithmetic
	V111		mean.
		13.3 Measures of Central Tendency	i) Calculate (for ungrouped and grouped
			data):
	ix		• Arithmetic mean by definition and
			using deviations from assumed
			mean.
	v	16.3 Trigonometric Ratios	v) Recognize signs of trigonometric
	X		ratios in different quadrants.
		16.4 Trigonometric Identities	Prove the trigonometric identities and
	xi		apply them to show different
			trigonometric relations.
		16.2 Sector of a Circle	i) Establish the rule $l = r\theta$ where r is
	vii		the radius of the circle, l the length of
			circular arc and θ the central angle
			measured in radians.
		25.1 Chords of a Circle	ii) A straight line, drawn from the
	viii		centre of a circle to bisect a chord
			(which is not a diameter) is
			perpendicular to the chord.
7		28.1 Angle in a Segment of a Circle	i) The angle
	viv		• in a semi-circle is a right angle,
			• in a segment greater than a semi-
			circle is less than a right angle,

			• in a segment less than a semi-
			circle is greater than a right angle.
a p	XV	30.2 Circles attached to Polygons	111) Escribe a circle to a given triangle.
Sec B	Q 2		
	i	8.3 Quadratic Formula	ii) Use quadratic formula to solve
		9.4Γ must in a D sharible to	quadratic equations.
	ii	8.4 Equations Reducible to	iv) Solve exponential equations in
			which the variables occur in exponents
		9.5 Formation of Quadratic	II)Form the quadratic equation whose
		Equation	roots, for example, are of the type:
			• $2\alpha + 1, 2\beta + 1,$
	iii		$\bullet \alpha$, β ,
			• $1/\alpha$, $1/\beta$
			• α/β , β/α
			• $\alpha + \beta$, $1/\alpha + 1/\beta$ Where α and β are the
			roots of a given quadratic equation
	iv	9.7 Simultaneous Equations	Solve the real life problems leading to
	,		quadratic equations.
	v	10.1 Ratio, Proportions and	11) Find 3^{10} , 4^{10} mean and continued
	•	Variations	proportion.
	vi	10.3 Joint Variation	ii) Solve real life problems based on
			variations.
		11.2 Resolution of Fraction into	Resolve an algebraic fraction into
		Partial Fractions	partial fractions when its denominator
	V11		consists of:
			1. non-repeated linear factors.
			11. non-repeated quadratic factors.
		12.1.1 Operations on Sets	111) Perform operation on sets
			• union
	V111		• intersection
			• difference
			• complement.
	ix	13.4 Measures of Dispersion	Measure range, variance and standard
		10.3 Irigonometric Ratios	vi) Find the values of remaining
	Х		trigonometric ratios if one
			trigonometric ratio is given.
	xi	25.1 Chords of a Circle	iii) Perpendicular from the centre of a
		26.1 Tangant to a Circle	circle on a chord disects it.
		20.1 Langent to a Circle	111) The two tangents drawn to a circle
	X11		from a point outside it, are equal in
			length.
		28.1 Angle in a Segment of a Circle	11) I ne angle in a semi-circle is
			a right angle.
	X111		(1) I ne opposite angles of any
			quadrilateral inscribed in a circle are
		27.1 Chanda and Ana	supplementary.
		27.1 Chords and Arcs	(iii) Equal chords of a circle (or of
			congruent circles) subtend equal
			1 4 41 4 7 4 41
	xiv		angles at the centre (at the

Q 38.4EquationsReducibletoiii) Solve reciprocal equations of the type. $a(x^2 + \frac{1}{x^2}) + b(x + \frac{1}{y}) + c = 0$ Q 412.1.2 Properties of Union and Intersectioniv) Give formal proofs of the following fundamental properties of union and intersection of two or three sets. • De Morgan's laws.Q 513.3 Measures of Central Tendency (for ungrouped and grouped data) • Median, Mode, Geometric Mean, Harmonic Mean.Q 630.2 Circles attached to polygons attached to polygons viii) Circumscribe a regular hexagon about a given circle.Q 630.2 Circles attached to polygons attached to polygons viii) Circumscribe a regular hexagon about a given circle.Q 630.2 Circles attached to polygons attached to polygons viii) Circumscribe a regular hexagon about a given circle.Q 611.2 Resolution of Fraction into partial fractions when its denominator consists of . Repeated quadratic factors.Q 724.1 Projection of a Side of a TriangleTriangle10.3 Kile of a side is equal to twice the square on any two sides is equal to twice the square on any two sides is equal to twice the square on any two sides is equal to twice the square on the median which bisects the third side (Apollonius' Theorem).	Sec C			
Conductor $a(x^{2} + \frac{-1}{2}) + b(x^{2} + \frac{1}{2}) + c = 0$ 12.1.2 Properties of Union and Intersectioniv) Give formal proofs of the following fundamental properties of union and intersection of two or three sets.Q.413.3 Measures of Central Tendency (for ungrouped and grouped data)Q.530.2 Circles attached to polygons Wiii) Circumscribe a regular hexagon about a given circle.Q.630.2 Circles attached to polygons Partial FractionsQ.611.2 Resolution of Fraction into Partial FractionsQ.711.2 Resolution of a Side of a TriangleQ.724.1 Projection of a Side of a TriangleQ.711.2 Resolution of a Side of a TriangleQ.711.2 Resolution of a Side of a TriangleQ.612.4.1 Projection of a Side of a TriangleQ.711.2 Resolution of a Side of a TriangleQ.711.3 Resolution of a Side of a TriangleQ.711.4 Resolution of a Side of a Side Together with twice the square on the median which bisects the thind side (Apollonius' Theorem).		03	8.4 Equations Reducible to	iii) Solve reciprocal equations of the type.
12.1.2 Properties of Union and Intersection (b) Give formal proofs of the following fundamental properties of union and intersection of two or three sets. Q.5 13.3 Measures of Central Tendency Q.6 i) Calculate for ungrouped and grouped data) + Median, Mode, Geometric Mean, Harmonic Mean. Q.6 30.2 Circles attached to polygons vii) Circumserithe a regular hexagon about a given circle. Q.6 11.2 Resolution of Fraction into Partial Fractions Resolve an algebraic fraction into consists of Q.7 24.1 Projection of a Side of a Triangle iii) In any triangle, the sum of the squares on any two sides is equal to twice the square on the float the third side together with twice the square on the modian which biseds the third side (Apollonius' Theorem).			Quadratic Form	$\frac{a(x^{2} + \frac{1}{x^{2}}) + b(x + \frac{1}{x}) + c = 0}{1 + \frac{1}{x^{2}}}$
Q.4 Interaction intersection of two or three sets. Dc. Morgan's laws. i) Calculate (for ungrouped and grouped data) • Median, Mode, Geometric Mean, Harmonic Mean. Q.6 30.2 Circles attached to polygons viii) Circlustife a regular hexagon about a given circle. Q.6 11.2 Resolution of Fraction into Partial Fractions Resolve an algebraic fraction into partial fractors. U.0 24.1 Projection of a Side of a Triangle iii) In any triangle, the sum of the squares on any two sides is equal to twice the square on half the third side together with twice the square on the median which biscets the third side (Apollonius' Theorem).			12.1.2 Properties of Union and Intersection	fundamental properties of union and
0 13.3 Measures of Central Tendency i) Calculate (for ungrouped and grouped data) • Median, Mode, Geometric Mean, Harmonic Mean. 0 6 30.2 Circles attached to polygons viii) Circumscribe a regular hexagon about a given circle. 0 6 30.2 Circles attached to polygons viii) Circumscribe a regular hexagon about a given circle. 0 6 11.2 Resolution of Praction into Partial Fractions when its denominator consists of . 0 6 24.1 Projection of a Side of a Triangle iii) In any triangle, the sum of the square on half the third side together with twice the square on thalf the third side together with twice the square on thalf the third side together with twice the square on the field with third side (Apollonius' Theorem).		Q 4		intersection of two or three sets.
13.3 Measures of Central Tendency i) Calculate (for ungrouped and grouped data) Median, Mode, Geometric Mean, Harmonic Mean 0 0 30.2 Circles attached to polygons viii) Circumscribe a regular hexagon about a given circle. 0 0 6 11.2 Resolution of Fraction into Partial fractions when its denominator consists of 0 0 6 Resolve an algebraic fraction into partial fractions when its denominator consists of 0 24.1 Projection of a Side of a Triangle iii) In any triangle, the sum of the square on the flow squares on any two sides is equal to twice the square on the flow square on the median which bisects the third side together with twice the square on the median which bisects the third side (Apollonius' Theorem).		Q 3 Quadratic FormReducible to Quadratic Formiii) Solve reciprocal equations of the t $a(x^2 + \frac{1}{x^2}) + b(x + \frac{1}{y}) + c = 0$ Q 412.1.2 Properties of Union and Intersectioniv) Give formal proofs of the follo fundamental properties of union intersection of two or three sets • De Morgan's laws. i) Calculate (for ungrouped and grouped data) • Median, Mode, Geometric Mean, Harmonic Mean.Q 630.2 Circles attached to polygons Partial Fractionsvii) Circumscribe a regular hexag about a given circle.Q 611.2 Resolution of Fraction into Partial FractionsResolve an algebraic fraction into any triangle, the sum of the siquares on any two sides is equ wice the square on half the thi side together with twice the square on the median which bisects the third side (Apollonius' Theorer	De Morgan's laws.	
Q 5 for ungrouped and grouped data) • Median, Mode, Geometric Mean, Harmonic Mean. • Median, Mode, Geometric Mean, Harmonic Mean. • Q 6 30.2 Circles attached to polygons • II.2 Resolution of Fraction into Partial fractions when its denominator consists of • Repeated quadratic factors. • Q 1 • Q 1 • Q 1 • Partial Fractions • Repeated quadratic factors. • III.0 • Q 1 • Projection of a Side of a Triangle • Triangle • O 1 • O 1 • O 2 • O 1 • O 2 • O 1 • O 2 • O 2 • O 2 • O 1 • O 2 • O 2 • O 1 • O 2 • O 2 • O 2 • O 2 • O 2 • O 2 • O 2 • O 2 • O 2 • O 2 • O 2 • O 2 • O 2 • O 2 <td></td> <td></td> <td>13.3 Measures of Central Tendency</td> <td>i) Calculate</td>			13.3 Measures of Central Tendency	i) Calculate
Image: Construction of the second		Q 5		(for ungrouped and grouped data)
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Q 6 Partial Fractions partial fractions when its denominator consists of Q 1 24.1 Projection of a Side of a Triangle ii) In any triangle, the sum of the squares on any two sides is equal to twice the square on that the third side together with twice the square on the median which bisects the third side (Apollonius' Theorem).			11.2 Resolution of Fraction into	Resolve an algebraic fraction into
Consists of • Repeated quadratic factors. iii) In any triangle, the sum of the squares on any two sides is equal to twice the square on half the third side together with twice the square on the median which bisects the third side (Apollonius' Theorem).		06	Partial Fractions	partial fractions when its denominator
24.1 Projection of a Side of a Triangle iii) In any triangle, the sum of the squares on any two sides is equal to twice the square on half the third side together with twice the square on the median which bisects the third side (Apollonius' Theorem).				consists of
Q7 In any change, the square on half the third side together with twice the square on the median which bisects the third side (Apollonius' Theorem).			24.1 Projection of a Side of a	• Repeated quadratic factors.
Q7 rive the square on half the third side together with twice the square on the median which bisects the third side (Apollonius' Theorem).			Triangle	squares on any two sides is equal to
gr side together with twice the square on the median which bisects the third side (Apollonius' Theorem).		07		twice the square on half the third
on the median which bisects the third side (Apollonius' Theorem).		Q /		side together with twice the square
thrd side (Apollonius' Theorem).				on the median which bisects the

MATHEMATICS SSC-II (3rd Set)

Table of Specification

Units	8. Quadratic Equations	9. Theory of Quadratic Equations	10. Variations	11. Partial Fractions	12. Sets and Functions	13. Basic Statistics	introduction to Trigonometr y	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	% age
Knowledge based		1(2)(1)	1(4)(1)		1(6)(1) 1(7)(1) 4 (8)	1(9)(1)		7 (8)	2 xi (4)		2 xiv (4)	2 xiii (4)		33	29.7%
Comprehension based	1(1)(1) 2 ii (4) 3 (8)	1(3)(1) 2 iii (4)	2 v (4)	2 vii (4) 1(5)(1)	2 viii (4)	1(8)(1) 5 (8)	1(10)(1) 1(11)(1) 1(12)(1) 2 x (4)	Υ,ς	2				6 (8)	55	46.5%
Application based	2 i (4)	2 iv (4)	2 vi (4)			2 ix (4)	Q		1(13)(1)	2 xii (4)		1(14)(1)	1(15)(1)	23	20.7%
Total marks for each unit	17	10	09	05	14	14	07	08	05	04	04	05	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 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