Roll No: | | | | | | | | Answer Sheet No: _____

Sig. of Candidate: _____ Sig. of Invigilator: _____

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

SECTION – A

Time allowed: 20 minutes Marks: 15

Note: Section-A is compulsory. All parts of this section are to be answered on the separately provided OMR Answer Sheet and should be completed in the first 20 minutes and handed over to the Centre Superintendent. Do not use lead pencil.

Q.1 Choose the correct answer by filling the relevant bubble for each question on the OMR Answer Sheet. Each part carries one mark.

(1) Which of the following types represents $(x-3)(x+3)=0$?

A. Quadratic equation B. Linear equation
C. Cubic equation D. Pure quadratic equation

(2) For what value of k, $2x^2+kx+3=0$ has equal roots?

A. $2\sqrt{6}$ B. 24
C. $\pm 2\sqrt{6}$ D. $\pm 6\sqrt{2}$

(3) If $z \propto (w+3)$ and $w=3,\ z=6$. What is value of $2z$ when $w=9$?

A. 12 B. 24
C. 6 D. 4.5

(4) If α and β are the roots of $2x^2-6x-4=0$. What is value of $\alpha^2\beta^3+\alpha^3\beta^2$?

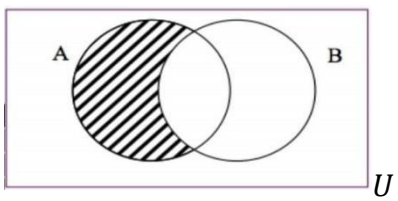
A. -12 B. 12
C. 6 D. -6

(5) Which of the following are the partial fractions of $\frac{x^3}{x^3+1}$?

A. $\frac{Ax^3}{x+1}+\frac{Bx+C}{x^2-x+1}$ B. $1+\frac{A}{x-1}+\frac{Bx+C}{x^2+x+1}$
C. $1+\frac{A}{x+1}+\frac{Bx+C}{x^2-x-1}$ D. $1+\frac{A}{x+1}+\frac{Bx+C}{x^2-x+1}$

(6) Which of the expressions shows the shaded region?

A. $A \cap B'$
B. $A' \cap B$
C. $A \cup B'$
D. $A' \cup B$



(7) If $\overline{x}=7,\ \sum f=30$ and $\sum fx=120+3k$ then value of k is

A. 30 B. -30
C. -11 D. 11

(8) If $sin\theta=\frac{4}{5}$ and $sec\theta=\frac{5}{3}$ then what is value of $tan\theta$?

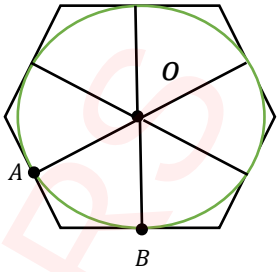
A. $\frac{2\sqrt{3}}{5}$ B. $\frac{\sqrt{34}}{3}$
C. $\frac{4}{3}$ D. $\frac{3}{4}$

(9) What is the radius of circle if an arc of 10cm subtends an angle of 60° ?

A. $\frac{30}{\pi}$ cm B. $\frac{\pi}{30}$ cm

C. $\frac{10800}{\pi}$ cm D. $\frac{1}{6}$ cm

(10) What is the value of $m\angle AOB$ in the adjoining figure of a hexagon?



A. $360° \div 45°$

B. $360° \div 60°$

C. $360° \div 30°$

D. $360° - 60°$

(11) What is the elevation of Sun if a pole of $6m$ high casts a shadow of $2\sqrt{3}m$?

A. 30° B. 45°

C. 60° D. 90°

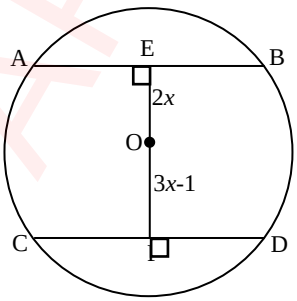
(12) What is the value of x if $m\overline{AB} = m\overline{CD} = 6cm$, $m\overline{OE} = 2x$ and $m\overline{OF} = 3x - 1$?

A. 1

B. -1

C. $\frac{7}{3}$

D. 3



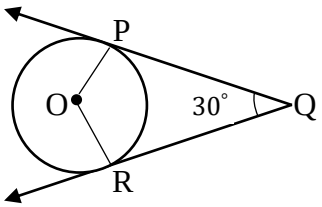
(13) In the adjoining figure, $m\angle PQR = 30°$. What is the value of $m\angle POR$?

A. 130°

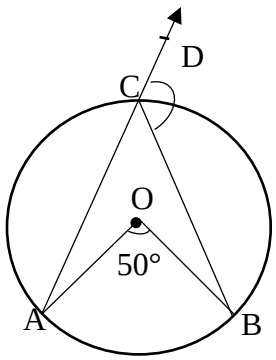
B. 150°

C. 60°

D. 75°



(14) In the drawn figure, what is value of $m\angle BCD$?



A. 165° B. 155°

C. 80° D. 130°

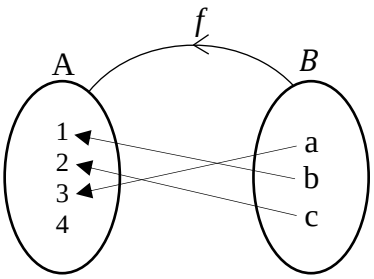
(15) If $f: B \to A$, then which of the following represents a/an ?

A. Onto function

B. Bijective function

C. Injective function

D. Into function



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

Time allowed: 2.40 hours Total Marks: 60

Note: Sections 'B' and 'C' comprise pages 1-2 and questions therein are to be answered on the separately provided Answer Book. Write your answers neatly and legibly.

SECTION – B (Marks 36)

Q.2 Attempt **ALL** parts. Each part carries **(04)** marks.

i. Solve the equation $3x^2 + 4x - 5 = 5x^2 + 2x + 1$.

OR

Solve the equation $\frac{x-1}{x+3} + \frac{x+3}{x-1} = \frac{13}{6}$

ii. Show that the equation $x^2 + (mx + c)^2 = a^2$ has equal roots if $c^2 = a^2(1 + m^2)$

OR

If θ and φ are the roots of $y^2 - 7y + 9 = 0$, then form an equation whose roots are 2θ and 2φ.

iii. P is directly proportional to Q and $P = 12$ when $Q = 4$. Write an equation connecting P and Q and find the value of P, when $Q = 8$.

OR

If $a:b = c:d = e:f$, then show that $\frac{b^2+d^2+f^2}{ab+cd+ef} = \sqrt[3]{\frac{bdf}{ace}}$

iv. If $U = \{1, 2, 3, \ldots\ldots, 10\}$, $A = \{2, 4, 6\}$ and $B = \{1, 3, 5\}$, then verify that $(A \cap B)' = A' \cup B'$

OR

If $A = \{1, 2, 3\}$ and $B = \{2, 4, 6\}$, then find domain and range of

$R = \{(x, y) | y = 2x\}$

v. The table shows the number of goals scored by a soccer team in 10 matches:

4	1	2	1	0	0	3	2	3	3

Find values of Mean, Median and Mode.

OR

The salaries of seven employees in rupees are as follows:

$43500, 46400, 50000, 48500, 44200, 47700, 41900$

Find standard deviation and variance of the salaries.

vi. If $\tan\theta = \frac{4}{3}$ and $\sin\theta < 0$. Find values of $\sec\theta$ and $\operatorname{cosec}\theta$ and show that $1 + \cot^2\theta = \operatorname{cosec}^2\theta$.

OR

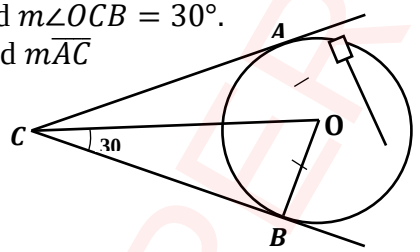
Prove that $\frac{\sin\theta}{1+\cos\theta} + \cot\theta = \operatorname{cosec}\theta$.

vii. In $\Delta PQR, m\overline{QR} = 6cm, m\overline{PR} = 2\sqrt{2}cm$ and $\angle PRQ = 135^\circ$. Draw perpendicular from P to $\overline{QR}$, to meet $\overline{QR}$ produced at S and find the numeric value of $m\overline{RS}$. Moreover, by using $(m\overline{PQ})^2 = (m\overline{QR})^2 + (m\overline{PR})^2 + 2(m\overline{QR})(m\overline{RS})$ find the numeric value of $m\overline{PQ}$.

OR

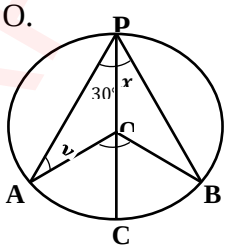
In triangle ABC with obtuse angle at A, if $\overline{CD}$ is an altitude on $\overline{BA}$ produced and $m\overline{AC} = m\overline{AB}$ then prove that $\overline{BC}^2 = 2(\overline{AB})(\overline{BD})$.

viii. In the figure, given that $\overline{OA} = 8cm$ and $m\angle OCB = 30°$.
Find the numeric values of $m\angle AOB$ and $m\overline{AC}$



OR

A, B, C and P are four points on a circle with centre O.
Given that POC is a diameter of the circle.
Find the numeric values of x, y and $m\angle AOB$
with reasons to justify your steps.



ix. Prove that if a line is drawn perpendicular to a radial segment of a circle at its outer end point, it is tangent to the circle at that point.

OR

Circumscribe a circle about a triangle ABC with sides $\overline{AB} = 6cm$, $\overline{BC} = 4cm$, $\overline{AC} = 4cm$ and measure its radius.

SECTION – C (Marks 24)

Note: Attempt **ALL** questions. Each question carries **(08)** marks.

Q.3 The area of a rectangle is 48cm^2. If length and width of each are increased by 4cm. the area of larger rectangle is increased by 12cm^2. Find the length and width of the original rectangle.

OR

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

Q.4 Using theorem of componendo-dividendo, find the value of $\frac{x-6a}{x+6a} - \frac{x+6b}{x-6b}$, if $x = \frac{12ab}{a-b}$

OR

Solve the following equation by using the componendo-dividendo property
$\frac{(x+5)^3-(x-3)^3}{(x+5)^3+(x-3)^3} = \frac{13}{14}$

Q.5 Prove that if two arcs of a circle (or of congruent circles) are congruent then the corresponding chords are equal.

OR

In a parallelogram ABCD, prove that $(AC)^2 + (BD)^2 = 2[(AB)^2 + (BC)^2]$

Federal Board of Intermediate and Secondary Education

SSC-II Examinations

Model Question Paper Mathematics

(Curriculum 2006)

Alignment of Questions with Student Learning Outcomes

Sec-A	Q 1	Contents and Scope	Student Learning Outcomes *	Cognitive Level **	Allocated Marks
	i	8.1 Quadratic Equation	Define quadratic equation.	K	1
	ii	9.3 Nature of Roots of a Quadratic Equation	iii) Discuss the nature of roots of a quadratic equation through discriminant.	K	1
	iii	10.1 Ratio, Proportions and Variations.	i) Define ratio, proportions and variations (direct and inverse)	U	1
	iv	9.4 Symmetric Functions of Roots of a Quadratic Equation.	ii) Evaluate a symmetric Function of the roots of a quadratic equation in terms of its coefficients.	U	1
	v	11.2 Resolution of Fraction into Partial Fractions.	Resolve an algebraic fraction into partial fractions when its denominator consists of non-repeated linear factors.	U	1
	vi	12.1.3 Venn Diagram	i) Use Venn diagram to represent • union and intersection of sets, • complement of a set.	U	1
	vii	13.3 Measures of Central Tendency	i) Calculate the arithmetic mean by definition (for ungrouped data)	U	1
	viii	16.3 Trigonometric Ratios	vi) Find the values of remaining trigonometric ratios if one trigonometric ratio is given.	K	1
	ix	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.	U	1

	x	30.2 Circles attached to polygons	Circumscribe a regular hexagon about a given circle.	U	1
	xi	16.5 Angle of elevation and Depression.	ii) Solve real life problems involving angle of elevation and depression	U	1
	xii	25.1 Chords of a Circle	Apply the theorem stated as: iv) If two chords of a circle are congruent then they will be equidistant from the centre.	A	1
	xiii	26.1 Tangent to a Circle	Apply the theorem stated as: iii) "The two tangents drawn to a circle from a point outside it, are equal in length" to solve appropriate problems.	A	1
	xiv	28.1 Angle in a Segment of a Circle	Apply the theorem stated as: 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" to solve appropriate problems.	A	1
	xv	12.3 Function	ii) To demonstrate the following: • Into function • One-one function • Injective function • Surjective function • Bijective function	K	1
Q2	i	8.2 Solution of Quadratic Equations **OR** 8.4 Equations Reducible to Quadratic Form	i) Solve a quadratic equation in one variable by • Factorization, • Completing square **OR** ii) Solve the equations of the type $ap(x) + \frac{b}{p(x)} = c$	U+U	4+4
	ii	9.1 Nature of the Roots of a Quadratic Equation **OR** 9.5 Formation of Quadratic Equation	iv) Determine the nature of roots of a given quadratic equation and verify the result by solving the equation. **OR** Establish the formula,	U+U	4+4

			$x^2 - (Sum\ of\ roots)x + (Product\ of\ roots) = 0$, to find a quadratic equation from the given roots.		
	iii	10.1 Ratio, Proportion and Variation. **OR** 10.4K-Method	i)Define ratio, proportions and variations (direct and inverse) **OR** i) Use K-Method to prove conditional equalities involving proportions.	U+K	4+4
	iv	12.1.2 Properties of Union and Intersection **OR** 12.3 Function	iv) De Morgan's Laws **OR** Define function and identify its domain, co-domain and range.	K+K	4+4
	v	13.3 Measures of Central Tendency **OR** 13.4 Measures of Dispersion	i) Calculate mean, median and mode for ungrouped data. **OR** Measure range, variance and standard deviation.	U+U	4+4
	vi	16.3 Trigonometric Ratios **OR** 16.4 Trigonometric Identities	v) Recognize the signs of trigonometric ratios in different quadrants vi) Find the values of remaining trigonometric ratios if one trigonometric ratio is given. **OR** Prove the trigonometric identities and apply them to show different trigonometric relations.	U+U	4+4
	vii	24.1 Projection of a Side of a Triangle	Prove the following theorem along with corollaries and apply it to solve the appropriate problems. 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.	A+A	4+4

	viii	26.1 Tangent to a Circle **OR** 27.1 Chords and arcs	Apply the theorem stated as: iii) "The two tangents drawn to a circle from a point outside it, are equal in length" to solve appropriate problems. **OR** Apply the theorem stated as: "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" to solve appropriate problems.	A+A	4+4
	ix	26.1 Tangent to a Circle **OR** 30.2 Circles attached to Polygons	i) If a line is drawn perpendicular to a radial segment of a circle at its outer end point, it is tangent to the circle at that point. **OR** i) Circumscribe a circle about a given triangle.	K+K	4+4
Q 3		9.7 Simultaneous Equations **OR** 11.2 Resolution of Fraction into Partial Fractions	Solve the real-life problems leading to quadratic equations. **OR** Resolve an algebraic fraction into partial fractions when its denominator consists of non-repeated quadratic factors.	U+U	8+8
Q 4		10.2 Theorems on Proportion	Apply theorem of componendo-dividendo to find proportions.	U+K	8+8
Q 5		27.1 Chords and Arcs **OR** 24.1 Projection of a Side of a Triangle	i) If two arcs of a circle (or of congruent circles) are congruent then the corresponding chords are equal. **OR** 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).	K+A	8+8

Federal Board of Intermediate and Secondary Education

ASSESSMENT GRID FOR MODEL QUESTION PAPER

Level: SSC-II **Subject: Mathematics** **Curriculum: 2006**

Units	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
Knowledge based	1 i (1)	1 ii (1)	2 iii (4) 4 (8)		1 xv (1) 2 iv (4) 2 iv (4)		1 viii (1)			2 ix (4)	5 (8)		2 ix (4)	40 30%
Comprehension/ Understanding based	2 i (4) 2 i (4)	1 iv (1) 2 ii (4) 2 ii (4) 3 (8)	1 iii (1) 2 iii (4) 4 (8)	1 v (1) 3 (8)	1 vi (1)	1 vii (1) 2 v (4) 2 v (4)	1 ix (1) 1 xi (1) 2 vi (4) 2 vi (4)						1 x (1)	68 50%
Application based								2 vii (4) 2 vii (4) 5 (8)	1 xii (1)	1 xiii (1) 2 viii (4)	2 viii (4)	1 xiv (1)		27 20%
Total marks for each unit	09	18	25	09	10	09	11	16	01	09	12	01	05	135

- 1, 2, 3 etc. stands for question numbers
- i, ii, iii etc. stands for part of question numbers
- (1), (2), (3) etc. stands for marks of question papers