Version No.			

ROLL NUMBER						

Answer Sheet No._____

Sign. of Candidate _____

Sign. of Invigilator _____

MODEL QUESTION PAPER

MATHEMATICS HSSC–I (Based on Curriculum 2006)

SECTION – A (Marks 20)
Time allowed: 25 Minutes

Note: Section-A is compulsory. All parts of this section are to be answered on the separate provided OMR Answer Sheet and should be completed in the first 20 minutes and hand 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) Complex number $\frac{1}{(2-i)^2}$, in the form $a+ib$ is:

A) $\frac{3}{25}+\frac{4}{25}i$ B) $\frac{3}{25}-\frac{4}{25}i$ C) $-\frac{4}{25}-\frac{3}{25}i$ D) $\frac{4}{25}-\frac{3}{25}i$

(2) What is the conjugate of $(1+i)^3$?

A) $-2+2i$ B) $-2-2i$ C) $2+2i$ D) $2-2i$

(3) For what value of k, $\begin{vmatrix} 2 & -1 & k \\ 3 & 1 & 2 \\ -1 & 3 & -2 \end{vmatrix} = 0$?

A) -2 B) 0 C) 1.2 D) 2

(4) What is the row rank of a matrix $\begin{bmatrix} 1 & 3 & 5 \\ 4 & 5 & 5 \\ 1 & 2 & 2 \end{bmatrix}$?

A) 0 B) 1 C) 2 D) 3

(5) For what value of h, vectors $\underline{a} = 3\underline{i} + \underline{j} - \underline{k}$ and $\underline{b} = h\underline{i} - 4\underline{j} + 4\underline{k}$ are parallel?

A) -12 B) 4 C) 8 D) 12

(6) What is the angle between two non-zero vectors $\underline{a}$ and $\underline{b}$,
if $|\underline{a} \times \underline{b}| = 5$ and $\underline{a}.\underline{b} = 5\sqrt{2}$?

A) 30° B) 45° C) 60° D) 90°

(7) If $a_n = 5n+1$ then sum of n-terms of the series is:

A) $\frac{n}{2}$ B) $\frac{n}{2}(7+3n)$ C) $\frac{n}{2}(7+4n)$ D) $\frac{n}{2}(7+5n)$

(8) If the Harmonic Mean of 30 and y is 24, then value of y is:

A) 20 B) 30 C) 40 D) 50

(9) The sum of first three terms of a series $\sum_{r=6}^{100}(r-2)^2$ is:

A) 2 B) 5 C) 15 D) 77

(10) In how many ways, 5 friends can be seated at a round table?

A) 5! B) 4! C) C_2^5 D) P_1^5

(11) What will be the probability of losing a game if the winning probability is 0.3?

A) 0.5 B) 0.6 C) 0.7 D) 0.8

(12) Which of the following is a correct option for the validity of $(3-5x)^{-1/2}$?

A) $|x|<5$ B) $|x|<\frac{5}{3}$ C) $|5x|<1$ D) $|x|<\frac{3}{5}$

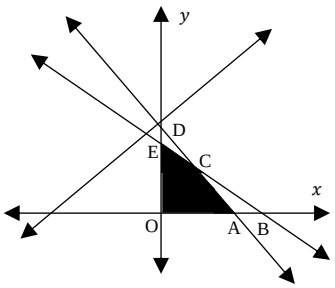
(13) If $f(x)=\frac{5}{x+3}$, then domain of $f^{-1}(x)$ is:

A) $\mathcal{R}$ B) $\mathcal{R}-\{0\}$ C) $\mathcal{R}-\{-3\}$ D) $\mathcal{R}-\{3\}$

(14) Which of the following are the corner points of the feasible region shown?

A) O,A,B,C,D,E B) O,A,C,E

C) A,C,E D) A,B,C,D,E



(15) If $\alpha+\beta+\gamma=180^\circ$ then $\operatorname{cosec}\alpha(\cos\beta\cos\gamma-\sin\beta\sin\gamma)$ is equal to:

A) $-\cot\alpha$ B) $\tan\alpha$ C) $\cot\alpha$ D) $\csc\alpha$

(16) Which of the following represents $2\cos 75^\circ\cos 15^\circ$?

A) $\frac{\sqrt{3}}{\sqrt{2}}$ B) $\frac{1}{\sqrt{2}}$ C) $\frac{1}{2}$ D) $\frac{\sqrt{3}}{2}$

(17) Which of the following represents $\left(\sin\frac{\alpha}{2}\right)\left(\cos\frac{\alpha}{2}\right)$?

A) $\frac{\Delta}{a^3}$ B) $\frac{\Delta}{ac}$ C) $\frac{\Delta}{bc}$ D) $\frac{\Delta}{abc}$

(18) In triangle ABC (with usual notations) if $a=\sqrt{3},\ b=3$ and $\beta=60°$, then value of α is:

A) 30° B) 45° C) 60° D) 75°

(19) Period of $tan3\theta$ is same as that of:

A) $sec3\theta$ B) $\cot 6\theta$ C) $sin6\theta$ D) $tan9\theta$

(20) What is the range of a trigonometric function $y=-4+2sin(3x+5)$?

A) $[-2,-6]$ B) $[-4,2]$ C) $[-4,5]$ D)$[-6,-2]$

Federal Board HSSC-I Examination
MODEL QUESTION PAPER MATHEMATICS
(Based on Curriculum 2006)

Time allowed: 2:35 hours Total Marks Section B and C: 80

Note: Answer all parts from Section 'B' and all questions from Section 'C' on the **E-sheet**. Write your answers on the allotted/given spaces.

SECTION – B (Marks 48)

Q2. Attempt all parts. Each part carries **(04)** marks.

(i) Find the multiplicative inverse of a complex number $\left(\frac{4-i}{3+2i}\right)^{-2}$

OR

Sum the following series up to n-terms.

$1 + (x + y) + (x^2 + xy + y^2) + (x^3 + x^2y + xy^2 + y^3) + \ldots\ldots$

(ii) Use row operations to find the inverse of a square matrix $\begin{bmatrix} 2 & -1 & 3 \\ -1 & 2 & 3 \\ 1 & -1 & 2 \end{bmatrix}$

OR

Using Properties of determinants, prove that $\begin{vmatrix} x+4 & 2x & 2x \\ 2x & x+4 & 2x \\ 2x & 2x & x+4 \end{vmatrix} = (5x+4)(4-x)^2$

(iii) Find angle between two vectors $\underline{a} = 2\underline{i} - \underline{j} + 5\underline{k}$ and $\underline{b} = 3\underline{i} + \underline{j} - \underline{k}$.

OR

Find area of a triangle whose vertices are $(-1, 2, 3)$, $(1, -2, 3)$ and $(1, 2, -3)$.

(iv) Find two numbers whose harmonic mean is $\frac{24}{5}$ and geometric mean 6.

OR

Sum the series $1 \times 2^1 + 3 \times 2^2 + 5 \times 2^3 + 7 \times 2^4 + \ldots + 99 \times 2^{50}$

(v) If $5 \times P_3^n = 4 \times P_3^{n+1}$, find the value of n.

OR

In a factory, there are 100 units of a certain product, 5 of which are defective. If 3 units are selected from the 100 units at random, then what is the probability that none of them are defective?

(vi) Using Principle of Mathematical Induction, prove that $n^2 \geq 3n + 5$ for all positive integers $n \geq 5$.

OR

Find a constant term in the expansion of $\left(2\sqrt{x} + \frac{3}{4\sqrt{x}}\right)^{10}$

(vii) Find an equation of a parabola of the form $ax^2 + bx + c = 0$, which crosses $x - axis$ at $(-8, 0)$ and $(4, 0)$ and a point $(-2, -6)$ lies on it.

OR

For a real valued function f defined by $f(x) = \frac{3x-1}{x+1}, x \neq 1$. Find domain and range of $f^{-1}(x)$.

(viii) Graph the feasible region subject to the following constraints.

$6x - 8y \leq 12 \quad ; \quad 3x + 4y \geq 6 \quad ; \quad x \geq 0 \quad ; \quad y \geq 0$

OR

Find the point of intersection of the following functions graphically.

$f(x) = 2x + 1 \; ; \; g(x) = 2x^2 + 4x - 1$

(ix) Prove that $\cos 5\theta + 2\cos 3\theta + \cos\theta = 4\cos^2\theta \cos 3\theta$

OR

Find the domain, range and period of a trigonometric function $y = \frac{8}{3}\cot\left(\frac{2\pi}{5}x\right)$

(x) Find the interior angles of a triangle whose side measures are $5cm$, $6cm$ and $7cm$.

OR

Find radii R and r of circumscribed circles, respectively, of triangle ABC having side measures 8, 16 and 19.

(xi) Draw one cycle of the graph of $y = 3sin(\theta - 3\pi)$

OR

In triangle ABC (with usual notations),
prove that $\frac{s^2}{c}\left[\tan\frac{\alpha}{2} + \tan\frac{\beta}{2}\right]\left[\tan\frac{\alpha}{2}\tan\frac{\beta}{2}\right] = (s - c)\cot\frac{\gamma}{2}$

(xii) Prove that $\cot^{-1}\left(\frac{1}{3}\right) - 2\tan^{-1}\left(\frac{2}{3}\right) = \cot^{-1}\left(\frac{41}{3}\right)$

OR

Solve: $2\cos^4 x - 9\cos^2 x + 4 = 0$ where $x \in [0, 2\pi]$

SECTION – C (Marks 32)

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

Q3. Solve the following simultaneous linear equations with complex coefficients.

$3x - (2 + i)y = i + 7 \quad ; \quad (2i - 1)x + (3i - 2)y = 2i + 1$

OR

Solve the following system of non-homogeneous linear equations using Gauss Jordan method.

$x + 5y + 3z = 7 \quad ; \quad 2x + 3y + z = 6 \quad ; \quad 3x - 2y + 2z = -3$

Q4. If 5, 7 and 9 are added to three consecutive terms of an A.P, the resulting numbers are in G.P. Find the numbers if their sum is 45.

OR

The sum of infinite number of terms in G.P is 17 and the sum of their squares is 51. Find the infinite Geometric series and its sum up to 5 terms.

Q5. If x is so small that its square and higher powers can be neglected, then show that

$$\frac{(1+x)^{\frac{3}{2}}(4-5x)^{\frac{1}{2}}}{(9+x)^{\frac{5}{2}}} \approx \frac{2}{243}\left(1 + \frac{43}{72}x\right)$$

OR

Find the maximum and minimum value of the function $f(x, y) = x + 3y$, subject to the following constraints

$2x + y \geq 4 \quad ; \quad 2x + 3y \leq 12 \quad ; \quad x + 2y \leq 16 \quad ; \quad x \geq 0 \quad ; \quad y \geq 0$

Q6. Prove that $24° + cos48° + cos96° + cos168° = \frac{1}{2}$.

OR

Solve graphically, the trigonometric equation: $sin(2x) = -x$, where $x \in [0, 2\pi]$