2011

Roll No. | | | | | | |

Answer Sheet No._____

Sig. of Candidate._____

Sig. of Invigilator._____

MATHEMATICS HSSC–II

SECTION – A (Marks 20)

Time allowed: 25 Minutes

NOTE:- Section–A is compulsory and comprises pages 1–2. All parts of this section are to be answered on the question paper itself. It should be completed in the first 25 minutes and handed over to the Centre Superintendent. Deleting/overwriting is not allowed. Do not use lead pencil.

Q. 1 Circle the correct option i.e. A / B / C / D. Each part carries one mark.

(i) What is the limit of the function $\lim_{x\to 5}\frac{x^2-25}{x-5}$?

A. 0 B. -10 C. 25 D. 10

(ii) What is the domain of the function $f(x)=\frac{x-1}{x-4}$?

A. R B. $R-\{1\}$ C. $R-\{4\}$ D. $R-\{-4\}$

(iii) For what value of a and b, the function $f(x)=ax+b$, will become a constant function?

A. $a=1,\ b=1$ B. $a\neq 0,\ b=1$ C. $a=1,\ b=0$ D. $a=0,\ b\neq 0$

(iv) What is the derivative of $\cos ec\ x$?

A. $-\cot^2 x$ B. $-\cos ec\ x\ \cot x$

C. $-\cot x$ D. $-\sec^2 x$

(v) The derivative of strictly decreasing function is always_____.

A. Negative B. Positive

C. Zero D. Both Positive and Negative

(vi) If $f(x)=a\sin 3x$ and $f'\left(\frac{\pi}{3}\right)=6$, then what is the value of a?

A. 2 B. -2 C. $-\frac{1}{2}$ D. $\frac{1}{2}$

(vii) What is the integral of $\sec x$?

A. $\sec x\ \tan x+c$ B. $-\sec x\ \tan x+c$

C. $\ln(\sec x+\tan x)+c$ D. $\ln(\sec x-\tan x)+c$

(viii) What is the value of $\int_{-\frac{1}{2}}^{\frac{1}{2}}\frac{1}{\sqrt{1-x^2}}dx$?

A. $\frac{\pi}{3}$ B. $-\frac{\pi}{6}$ C. $-\frac{\pi}{3}$ D. $\frac{\pi}{6}$

(ix) Which is the solution of the equation $\frac{dy}{dx}=-y$?

A. $y=ce^{1/x}$ B. $y=ce^{-1/x}$ C. $y=ce^{-x}$ D. $y=ce^{x}$

(x) For what value of a, the point $(2,\ -3)$ is the mid-point of the line segment joining the points $A(1,\ a),\ B(3,\ 2a)$?

A. 2 B. -2 C. $\frac{1}{2}$ D. $-\frac{1}{2}$

2011

DO NOT WRITE ANYTHING HERE

(xi) If two lines with slopes m_1 and m_2 are parallel to each other, then which is correct?

A. $m_1 = m_2$ B. $m_1 = -m_2$ C. $m_1 = \frac{1}{m_2}$ D. $m_1 = -\frac{1}{m_2}$

(xii) If $ax^2 + 2hxy + by^2 = 0$ represents two lines, then the lines are said to be orthogonal if _____.

A. $a + b = 0$ B. $a - b = 0$ C. $h = a + b$ D. $h = a - b$

(xiii) What is the distance of the point $(2, -3)$ from y-axis?

A. -2 B. 2 C. -3 D. 3

(xiv) At which point, does the function $f(x, y) = 3x + 2y$ have minimum value?

A. $(4, 1)$ B. $(1, 4)$ C. $(2, 3)$ D. $(3, 2)$

(xv) What is the length of latus rectum of the parabola $4y^2 = -64x$?

A. -64 B. 64 C. -16 D. 16

(xvi) What is the centre of the circle $3x^2 + 3y^2 - 12x + 15y + 7 = 0$?

A. $(12, -15)$ B. $(-12, 15)$ C. $\left(2, -\frac{5}{2}\right)$ D. $\left(-2, \frac{5}{2}\right)$

(xvii) A conic is said to be a hyperbola if _____.

A. $e = 1$ B. $e = 0$ C. $e > 1$ D. $e < 1$

(xviii) The point $P(x_1, y_1)$ lies outside the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ if:

A. $x_1^2 + y_1^2 + 2gx_1 + 2fy_1 + c > 0$ B. $x_1^2 + y_1^2 + 2gx_1 + 2fy_1 + c = 0$

C. $x_1^2 + y_1^2 + 2gx_1 + 2fy_1 + c < 0$ D. None of these

(xix) Which of the following triples can be the direction angles of a single vector?

A. $30^o, 45^o, 60^o$ B. $30^o, 45^o, 90^o$

C. $45^o, 60^o, 60^o$ D. $30^o, 45^o, 45^o$

(xx) For what value of α, the vectors $\vec{u} = \alpha\hat{i} + 2\hat{j} - \hat{k}$ and $\vec{v} = \hat{i} + \alpha\hat{j} + 3\hat{k}$ are perpendicular to each other?

A. 3 B. -3 C. -1 D. 1

For Examiner's use only:

Total Marks:	20
Marks Obtained:	

2011

MATHEMATICS HSSC–II

Time allowed: 2:35 Hours **Total Marks Sections B and C: 80**

NOTE:- Answer any ten parts from Section 'B' and any five questions from Section 'C' on the separately provided answer book. Use supplementary answer sheet i.e. Sheet–B if required. Write your answers neatly and legibly.

SECTION – B (Marks 40)

Q. 2 **Attempt any TEN parts. All parts carry equal marks.** **(10 x 4 = 40)**

(i) Determine whether the function $f(x)=\dfrac{x^3-x}{x^2+1}$, is even or odd.

(ii) Evaluate $\underset{x\to 0}{Lim}\dfrac{\sqrt{x+a}-\sqrt{a}}{x}$

(iii) If $y=x^4+2x^2+2$, then prove that $\dfrac{dy}{dx}=4x\sqrt{y-1}$

(iv) Find $\dfrac{dy}{dx}$ if $xy+y^2=2$

(v) Find $\dfrac{dy}{dx}$ if $y=(x+1)^x$

(vi) Evaluate $\int \ln x\, dx$

(vii) Evaluate $\int_2^{\sqrt{5}} x\sqrt{x^2-1}\, dx$

(viii) Find the area between x-axis and the curve $y=x^2+1$, from $x=1$ to $x=2$.

(ix) Show that the points $A(3,\ 1)$, $B(-2,\ -3)$ and $C(2,2)$ are the vertices of an isosceles triangle.

(x) Find an equation of the line passing through the point $(5,\ -8)$ and is perpendicular to the join of $A(-15,\ -8)$ and $B(10,\ 7)$

(xi) Find the centre and radius of the circle $4x^2+4y^2-8x+12y-25=0$

(xii) Find the equations of the tangents to the circle $x^2+y^2=2$, being perpendicular to the line $3x+2y=6$.

(xiii) Find the points of intersection of the conics $3x^2-4y^2=12$ and $3y^2-2x^2=7$.

(xiv) A particle, acted upon by the forces $4\hat{i}+\hat{j}-3\hat{k}$ and $3\hat{i}-\hat{j}-\hat{k}$, is displaced from the point $A(1,\ 2,\ 3)$ to $B(5,\ 4,\ 1)$. Find the work done.

SECTION – C (Marks 40)

Note:- Attempt any FIVE questions. All questions carry equal marks. **(5 x 8 = 40)**

Q. 3 Prove that $\underset{x\to a}{Lim}\dfrac{x^n-a^n}{x-a}=na^{n-1}$

Q. 4 If $y=a\cos(\ln x)+b\sin(\ln x)$, then show that $x^2y_2+xy_1+y=0$

Q. 5 Evaluate $\int\sqrt{4-5x^2}\, dx$

Q. 6 Find an equation of the line passing through the point of intersection of the lines $x+2y+3=0$ and $3x+4y+7=0$ and making equal intercepts on the axes.

Q. 7 Minimize the function $f(x,\ y)=2x+3y$, subject to the constraints $3x+4y\le 12$, $2x+y\le 4$, $4x-y\le 4$, $x\ge 0$; $y\ge 0$ **(Use graph paper)**

Q. 8 Find equation of the ellipse as locus of points $P(x,\ y)$ such that the sum of the distances from P to the fixed points $F(0,\ 0)$ and $F'(1,\ 1)$ is 2

Q. 9 Use vectors to prove that $b^2=c^2+a^2-2ca\cos B$