2019

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) The term function was recognized by the German mathematician _____.

A. Euler B. Newton C. Laplace D. Leibniz

(ii) If $f(x)=\frac{x}{x^2-4}$, then f is not defined at $x=$_____.

A. $4, -4$ B. $1, -1$ C. $2, -2$ D. 0

(iii) If $f(x)=2x+1$, $g(x)=x^2-1$, then $gog(x)=$_____.

A. x^2-2x^4 B. x^4-2x^2 C. $2x^2-1$ D. x^2-1

(iv) $\lim\limits_{x\to-\infty}\frac{2-3x}{\sqrt{3+4x^2}}=$_____.

A. $\frac{3}{2}$ B. $\frac{-3}{2}$ C. $\frac{2}{3}$ D. $\frac{1}{2}$

(v) $\frac{d}{dx}\left(a^{2x}\right)=$_____.

A. $2a^{2x}\ln a$ B. $2xa^{2x-1}$ C. $a^{2x}\ln a$ D. $2a^{2x}$

(vi) $\frac{d}{dx}(\sin 2\pi)=$_____.

A. $2\cos 2\pi$ B. 0 C. $\cos 2\pi$ D. $2\sin\pi$

(vii) $\frac{d}{dx}\left(2e^3\right)=$_____.

A. $2e^3+\ln e$ B. $6e^2$ C. 0 D. $2e^3\ln e^3$

(viii) $\frac{d}{dx}\left(x-\frac{1}{x}\right)=$_____.

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

(ix) $\int\tan x\,dx=$_____.

A. $\ln\sin x+c$ B. $\ln\cos x+c$ C. $\ln\sec x+c$ D. $-\ln\cos x+c$

(x) $\int\left(\frac{1}{x}+\sec^2 x\right)dx=$_____.

A. $\ln x+\sec x+c$ B. $x+\tan x+c$ C. $\ln x+\tan x+c$ D. $x-\tan x+c$

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(xi) $\int \frac{e^{\sin^{-1}x}}{\sqrt{1-x^2}}\,dx =$ _____.

A. $-e^{\sin^{-1}x}+c$ B. $e^{\sin^{-1}x}+c$ C. $-e^{\cos^{-1}x}+c$ D. $e^{\cos^{-1}x}+c$

(xii) The distance of the point $(1,\ 1)$ from origin is_____.

A. $\sqrt{2}$ B. 2 C. 1 D. 4

(xiii) The point 'P' dividing externally the line joining the points $A(x_1,\ y_1)$ and $B(x_2,\ y_2)$ in the ratio $k_1 : k_2$ has coordinates_____.

A. $\left(\frac{k_1x_2-k_2x_1}{k_1-k_2},\ \frac{k_1y_2-k_2y_1}{k_1-k_2}\right)$ B. $\left(\frac{k_1x_2-k_2x_1}{k_1+k_2},\ \frac{k_1y_2-k_2y_1}{k_1+k_2}\right)$

C. $\left(\frac{k_1x_2+k_2x_1}{k_1+k_2},\ \frac{k_1y_2+k_2y_1}{k_1+k_2}\right)$ D. $\left(\frac{x_1+x_2}{2},\ \frac{y_1+y_2}{2}\right)$

(xiv) Equation of y-axis is _____.

A. $y=0$ B. $x=0$ C. $y=mx$ D. $y=mx+c$

(xv) The graph of inequality $3x+2y>3$ is a_____.

A. Closed half plane B. Line only

C. Open half plane D. Full plane

(xvi) Equation of circle with centre at $(0,\ 0)$ and having radius 'r' is_____.

A. $x^2-y^2=r^2$ B. $ax^2+by^2=r^2$ C. $ax+by=c$ D. $x^2+y^2=r^2$

(xvii) The length of tangent drawn from the point $(1,\ 1)$ to the circle $x^2+y^2-3x+9y+8=0$ is_____.

A. 5 B. 6 C. 8 D. 4

(xviii) The vertex of the parabola $(x-1)^2=8(y+2)$ is_____.

A. $(1,\ 2)$ B. $(-1,\ 2)$ C. $(1,\ -2)$ D. $(0,\ 0)$

(xix) In vector product, $\vec{u}\times\vec{v}=0$ if_____.

A. $\theta=90°$ B. $\theta=0$ C. $\theta=270°$ D. None of these

(xx) The volume of parallelopiped determined by $\underline{u}=\underline{i}+2\underline{j}-\underline{k}$, $\underline{v}=\underline{i}-3\underline{j}+3\underline{k}$, $\underline{w}=\underline{i}-7\underline{j}-4\underline{k}$ is:

A. 51 cubic unit B. 40 cubic unit C. 45 cubic unit D. 48 cubic unit

For Examiner's use only:

Total Marks:	20
Marks Obtained:	

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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) The real valued function 'f' and 'g'are defined below, find $fog(x)$ and $gof(x)$

$$f(x)=\frac{1}{\sqrt{x-1}},\quad x\neq 1,\qquad g(x)=\left(x^2+1\right)^2$$

(ii) Evaluate $\lim\limits_{x\to\pi}\dfrac{\sin x}{\pi-x}$

(iii) Differentiate w.r.t. 'x' $\quad y=\dfrac{\left(x^2+1\right)^2}{x^2-1}$

(iv) Show that $2^{x+h}=2^x\left[1+(\ln 2)h+\dfrac{(\ln 2)^2h^2}{2!}+\dfrac{(\ln 2)^3h^3}{3!}+-----\right]$

(v) Find the point on the curve $y=x^2-1$, that is closest to the point $(3,\ -1)$.

(vi) Use differential to approximate the value of $\sin 61^{\circ}$

(vii) Solve $\int\dfrac{x.e^x}{(1+x)^2}\,dx$

(viii) Find the area between the curve $y=x(x-1)(x+1)$ and the x-axis.

(ix) Find the point three-fifth of the way along the line segment from $A(-5,\ 8)$ to $B(5,\ 3)$.

(x) Plot the Celsius (C) and Fahrenheit (F) temperature scales on the horizontal axis and the vertical axis, respectively. Draw the line joining the freezing point and the boiling point of water.

(xi) Graph the solution region of the system of linear in equalities and find corner points:
$5x+7y\leq 35;\quad -x+3y\leq 3;\quad x\geq 0$

(xii) Prove that the perpendicular dropped from a point of a circle on a diameter is a mean proportional between the segments into which it divides the diameter.

(xiii) A parabolic arch has a $100m$ base and height $25m$. Find the height of the arch at the point $30m$ from the centre of the base.

(xiv) Find 'α', so that $\left|\alpha\,\underline{i}+(\alpha+1)\,\underline{j}+2\underline{k}\right|=3$

SECTION – C (Marks 40)

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

Q. 3 Find the graphical solution of equation $2x=\tan x;\quad x\in\left[-180^{\circ},\ 180^{\circ}\right]$

Q. 4 Differentiate from first principle $y=\cos\sqrt{x}$

Q. 5 Solve the differential equation $\left(y-x\dfrac{dy}{dx}\right)=2\left(y^2+\dfrac{dy}{dx}\right)$

Q. 6 Find the area of the region bounded by the triangle whose sides are
$7x-y-10=0;\quad 10x+y-41=0;\quad 3x+2y+3=0$

Q. 7 A dealer wishes to purchase a number of fans and sewing machines. He has only $Rs.5760$ to invest and has space atmost for 20 items. A fan costs him $Rs.360$ and a sewing machine costs $Rs.240$. His expectation is that he can sell a fan at a profit of $Rs.22$ and a sewing machine at a profit of $Rs.18$. Assuming that he can sell all the items that he can buy, how should he invest his money in order to maximize his profit.

Q. 8 An astroid has elliptic orbit with the sun at one focus. Its distance from the sun ranges from 17 million to 183 million miles. Write an equation of the orbit of the asteroid.

Q. 9 Find the volume of the tetrahedron with the vertices $(2,\ 1,\ 8)$, $(3,\ 2,\ 9)$, $(2,\ 1,\ 4)$ and $(3,\ 3,\ 10)$.