RWP-1-24

Roll No ______ (to be filled in by the candidate)	HSSC-(P-II)- A-2024	Paper Code	8	1	9	5

(For All Sessions)

Mathematics (Objective)

(GROUP-I)

Time: 30 Minutes **Marks : 20**

Note: Write Answers to the Questions on the objective answer sheet provided. Four possible answers A, B, C and D to each question are given. Which answer you consider correct, fill the corresponding circle A, B, C or D given in front of each question with Marker or Pen ink on the answer sheet provided.

1.	Midpoint of $A(2,0), B(0,2)$ is:	(A)	$(0,2)$	(B)	$(2,0)$	(C)	$(2,2)$	(D)	$(1,1)$
2.	The ___ point satisfies $x+2y<6$	(A)	$(4,1)$	(B)	$(3,1)$	(C)	$(1,3)$	(D)	$(1,4)$
3.	In a conic, the ratio of the distance from a fixed point to the distance from a fixed line is:	(A)	Focus	(B)	Vertex	(C)	Ecentricity	(D)	Centre
4.	Standard equation of Parabola is:	(A)	$y^2=4ax$	(B)	$x^2+y^2=a^2$	(C)	$\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$	(D)	$\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$
5.	Equation of tangent to circle $x^2+y^2=a^2$ at $P(x_1,y_1)$ is:	(A)	$xx_1+yy_1=a^2$	(B)	$xx_1-yy_1=a^2$	(C)	$xy_1+yx_1=a^2$	(D)	$xy_1-yx_1=a^2$
6.	The volume of parallelopiped =____.	(A)	$(\underline{u}\times\underline{v}).\underline{\omega}$	(B)	$(\underline{u}\times\underline{v})\times\underline{\omega}$	(C)	$\underline{u}\times(\underline{v}\times\underline{\omega})$	(D)	$\underline{u}\times(\underline{u}\times\underline{v})$
7.	The non-zero vectors are perpendicular when:	(A)	$\underline{u}.\underline{v}=1$	(B)	$\lvert\underline{u}.\underline{v}\rvert=1$	(C)	$\underline{u}.\underline{v}=0$	(D)	$\underline{u}.\underline{v}\neq 0$
8.	$\underline{j}\times\underline{k}=$ ______.	(A)	$\underline{i}$	(B)	$-\underline{i}$	(C)	0	(D)	$\underline{k}$
9.	The range of $f(x)=2+\sqrt{x-1}$ is:	(A)	$[1,+\infty)$	(B)	$[2,+\infty)$	(C)	$(1,+\infty)$	(D)	$(2,+\infty)$
10.	The perimeter P of square as a function of its area A:	(A)	$3\sqrt{A}$	(B)	$4\sqrt{A}$	(C)	$\sqrt{A}$	(D)	$2\sqrt{A}$
11.	If $f(x)=\frac{1}{x^2}$ then $f'(3)=$ ______.	(A)	$\frac{1}{9}$	(B)	$\frac{-2}{3}$	(C)	$\frac{-2}{27}$	(D)	$\frac{1}{27}$
12.	If $f'(c)=0$ & $f''(c)>0$ then C is point of:	(A)	Maxima	(B)	Minima	(C)	Inflection	(D)	Constant
13.	$\frac{d}{dx}(\log_a x)=$ _____.	(A)	$\frac{1}{x\ln a}$	(B)	$\frac{\ln a}{x}$	(C)	$\frac{1}{x}$	(D)	$\frac{-1}{x\ln a}$
14.	$\frac{d}{dx}(\cot ax)=$ _____.	(A)	$cosec^2ax$	(B)	$a\,cosec^2ax$	(C)	$-a\,cosec^2ax$	(D)	$-a\,cosec\,ax$
15.	$\int\frac{1}{\sqrt{1-x^2}}dx=$ _____.	(A)	$Sin^{-1}x+c$	(B)	$Cos^{-1}x+c$	(C)	$-Sin^{-1}x+c$	(D)	$-Cos^{-1}x+c$
16.	$\int\frac{1}{x}dx=$ _____.	(A)	$\ln x+c$	(B)	$\frac{1}{x^2}+c$	(C)	$-\frac{1}{x^2}+c$	(D)	$\frac{1}{x}+c$
17.	The solution of differential equation $\frac{dy}{dx}=-y$ is:	(A)	$y=xe^{-x}$	(B)	$y=ce^{-x}$	(C)	$y=e^x$	(D)	$y=ce^x$
18.	$\int_0^1\frac{1}{1+x^2}dx=$ _____.	(A)	$\frac{\pi}{4}$	(B)	$\frac{2\pi}{3}$	(C)	$\frac{3\pi}{4}$	(D)	π
19.	$x-$ intercept of the line $2x+5y-1=0$ is:	(A)	2	(B)	3	(C)	$\frac{1}{2}$	(D)	$\frac{1}{5}$
20.	Slope of $y-axis$ is:	(A)	0	(B)	1	(C)	-1	(D)	$Undefined$

R

RWP 1-24

Roll No ________ to be filled in by the candidate

HSSC-(P-II)-A/2024
(For All Sessions)
(GROUP-I)

Marks : 80

Time: 2:30 hours

Mathematics (Subjective)

SECTION-I

2. Write short answers of any eight parts from the following: (8x2=16)

i. If $f(x) = 2x + 1$, then find $fof\ (x)$.

ii. Express the area A of a circle as a function of its circumference C.

iii. Evaluate $\lim\limits_{h\to 0} \frac{\sqrt{x+h}-\sqrt{x}}{h}$

iv. Define continuous function.

v. Differentiate $\left(\sqrt{x} - \frac{1}{\sqrt{x}}\right)^2 w.r.t\ x$

vi. Find $\frac{dy}{dx}$ if $y^2 - xy - x^2 + 4 = 0$

vii. Differentiate $x^2 sec4x w.r.t\ x$

viii. Differentiate $sin^2 x w.r.t.\ cos^4 x$

ix. Find $f'(x)$ if $f(x) = e^x(1 + lnx)$

x. Find y_2 if $y = ln(x^2 - 9)$

xi. Prove that $ln(1 + x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \cdots$

xii. Determine the interval in which $f(x) = cosx$ is decreasing; $x \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$.

3. Write short answers of any eight parts from the following: (8x2=16)

i. Solve the differential equation $sec^2 x\ tan\ y\ dx + sec^2 y \tan x\ \ dy = 0$

ii. Find the area between $x - axis$ and the curve $y = x^2 + 1$ from $x = 1$ to $x = 2$

iii. Evaluate: $\int_1^e x\ lnx\ dx$

iv. Evaluate the integral $\int \frac{-2x}{\sqrt{4-x^2}} dx$

v. Evaluate: $\int \left(\sqrt{x} - \frac{1}{\sqrt{x}}\right)^2 dx$

vi. Evaluate the integral $\int (a - 2x)^{3/2} dx$

vii. Find the approximate change in the volume of a cube if length of its each edge changes from 5 to 5.02.

viii. Show that the points $A(0, 2), B(\sqrt{3}, -1)$ and $C(0, -2)$ are vertices of a right triangle.

ix. Convert the equation of line $4x + 7y - 2 = 0$ into normal form.

x. Fine the angle from the line with slope $\frac{-7}{3}$ to the line with slope $\frac{5}{2}$.

xi. Find the pair of lines represented by $3x^2 + 7xy + 2y^2 = 0$.

xii. Find the point of intersection of lines $3x + y + 12 = 0$ and $x + 2y - 1 = 0$.

4. Write short answers of any nine parts from the following: (9x2=18)

i. Define feasible region.

ii. Graph the solution set of in-equality $3x + 7y \geq 21$.

iii. Find equation of circle with ends of diameter at $(-3, 2)$ and $(5, -6)$.

iv. Write down equation of tangent to the circle $x^2 + y^2 = 25$ at $(5\ cos\theta\ , 5\ sin\theta)$

v. Find focus and vertex of Parabola $x^2 = 4(y - 1)$

vi. Find equation of ellipse with data Foci $(\pm 3, 0)$ Minor axis of length 10.

vii. Find center of hyperbola $x^2 - y^2 + 8x - 2y - 10 = 0$

R

RWP-1-24

viii. Find equation of Normal to $y^2 = 4ax$ at $(at^2, 2at)$.

ix. Find the sum of vector $\overrightarrow{AB}$ and $\overrightarrow{CD}$ given four points $A(1,-1)B(2,0)C(-1,3)$ and $D(-2,2)$

x. Find $\propto$, so that $|\propto \underline{i} + (\propto +1)\underline{j} + 2\underline{k}|=3$

xii. If $\underline{v}$ is a vector for which $\underline{v}.\underline{i} = 0\underline{v}.\underline{j} = 0\underline{v}.\underline{k} = 0$, find $\underline{v}$

xii. Find the area of triangle determined by the points $P(0,0,0)$ $Q(2,3,2)$ and $R(-1,1,4)$

xiii. Find the value of $2\hat{\imath} \times 2\hat{\jmath}.\hat{k}$

SECTION-II

Note Attempt any three questions. Each question carries equal marks: (10x3=30)

5. (a) Find the values of m and n, so that given function f is continuous at $x = 3$ when (05)

$$f(x) = \begin{cases} mx, & if\ x < 3 \\ n, & if\ x = 3 \\ -2x+9, & if\ x > 3 \end{cases}$$

(b) Find $\frac{dy}{dx}$, when $x = \frac{a(1-t^2)}{1+t^2}, y = \frac{2bt}{1+t^2}$ (05)

6. (a) If $y = (cos^{-1}x)^2$, prove that $(1-x^2)y_2 - xy_1 - 2 = 0$. (05)

(b) Evaluate the integral $\int e^x sinx\ cosx\ dx$. (05)

7. (a) Solve the differential equation $y - x\frac{dy}{dx} = 3\left(1 + x\frac{dy}{dx}\right)$. (05)

(b) Graph the feasible region and corner points of the inequalities (05)

$$2x + y \leq 10; \qquad x + 4y \leq 12; x + 2y \leq 10;$$

8. (a) Show that the circles: $x^2 + y^2 + 2x - 8 = 0$; $x^2 + y^2 - 6x + 6y - 46 = 0$ touch internally. (05)

(b) Using vector method, for any triangle ABC, prove that: $c^2 = a^2 + b^2 - 2ab\ cosC$. (05)

9. (a) Find the focus, vertex and directrix of the Parabola; $x^2 = 4(y-1)$ (05)

(b) Find the lines represented by $3x^2 + 7xy + 2y^2 = 0$ and also find measure of the angle between them. (05)