MTN-12-G1-19

aper Code Number: 4195

2019 (A)

Roll No: ______________

INTERMEDIATE PART-II ($12^{th}$ CLASS)

**ATHEMATICS PAPER-II** TIME ALLOWED: 30 Minutes

**ROUP-I** **OBJECTIVE** MAXIMUM MARKS: 20

**lote: You have four choices for each objective type question as A, B, C and D. The choice which you hink is correct, fill that bubble in front of that question number. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. Attempt as many uestions as given in objective type question paper and leave others blank. No credit will be awarded in ase BUBBLES are not filled. Do not solve questions on this sheet of OBJECTIVE PAPER.**

**Q.No.1**

(1) $\int_1^2 2x\,dx =$ (A) 3 (B) 2 (C) 1 (D) 0

(2) $\int_1^2 \frac{1}{x}dx =$ (A) $2\ell nx$ (B) $\ell n2$ (C) $\ell n(1)$ (D) $\ell n3$

(3) $\int 5^{2x}dx =$ (A) $5^{2x}$ (B) $2(5^{2x})$ (C) $5^{2x}\ell n5$ (D) $2(5^{2x}\ell n5)$

(4) Distance of line $x + 2y + 5 = 0$ from origin is:- (A) 1 (B) $\sqrt{5}$ (C) 5 (D) 2

(5) Length of perpendicular from ( 1, 1 ) to the line $4x - 3y + 9 = 0$ equals:-
(A) 2 (B) 4 (C) 3 (D) 9

(6) Equation of horizontal line through ( 2, 3 ) is:- (A) $y = 3$ (B) $y = 2$ (C) $x = 3$ (D) $x = 2$

(7) Slope of vertical line is:- (A) 0 (B) 1 (C) $\infty$ (D) 2

(8) If $3x + 2y \leq 6$, point does not satisfy:- (A) ( 1 , 0 ) (B) ( 0 , 1 ) (C) ( 0 , 0 ) (D) ( 3 , 2 )

(9) Radius of circle $x^2 + y^2 - 4x - 6y = 0$ is:- (A) $\sqrt{13}$ (B) $\sqrt{11}$ (C) $\sqrt{5}$ (D) 13

(10) Directrix of parabola $x^2 = 20y$ is:- (A) $x = 10$ (B) $x = 5$ (C) $y = -5$ (D) $x = -5$

(11) Parabola $x^2 = -8y$ opens:-
(A) Rightwards (B) Leftwards (C) Upwards (D) Downwards

(12) Magnitude of vector $6\underline{i} + 3\underline{j} - 2\underline{k}$ is:- (A) 7 (B) 6 (C) 3 (D) $-2$

(13) Direction cosines of $y$ – axis are:-
(A) 0, 0, 1 (B) 1, 0, 0 (C) 0, 1, 0 (D) $\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}$

(14) If $f(x) = x^3 + x$, then $f(x)$ is:-
(A) Constant function (B) Even function (C) Odd function (D) Implicit function

(15) $\lim_{x \to 4} \frac{x^2 - 6x + 8}{x - 4} =$ (A) 4 (B) 2 (C) 6 (D) 8

(16) $x = 3\cos t$, $y = 3\sin t$ represents:- (A) Line (B) Circle (C) Ellipse (D) Hyperbola

(17) If $f(x) = \sin x$, then $f''\left(\pi/2\right) =$ (A) 0 (B) 1 (C) 2 (D) $-1$

(18) $\frac{d}{dx}(\coth x) =$ (A) $-\operatorname{cosech}^2 x$ (B) $\operatorname{cosech}^2 x$ (C) $\tanh^2 x$ (D) $\coth x \ \operatorname{sech} x$

(19) $\frac{d}{dx}(e^{x^2}) =$ (A) $e^{x^2}$ (B) $2e^{x^2}$ (C) $2xe^{x^2}$ (D) $2e^x$

(20) $\int \frac{\sin 2x}{4\sin x}dx =$ (A) $\sin 2x + c$ (B) $2\sin 2x + c$ (C) $\frac{1}{2}\sin x + c$ (D) $2\sin x + c$

2019 (A) Roll No: MTN-12-G1-19

INTERMEDIATE PART-II (12th CLASS)

**MATHEMATICS PAPER-II** TIME ALLOWED: 2.30 Hours

**GROUP-I** **SUBJECTIVE** MAXIMUM MARKS: 80

**NOTE: - Write same question number and its part number on answer book, as given in the question paper.**

## SECTION-I

**2. Attempt any eight parts.** **$8 \times 2 = 16$**

(i) Find the domain and range of $f(x) = \sqrt{x^2 - 4}$

(ii) If $f(x) = 2x + 1$, $g(x) = x^2 - 1$, find $g$ of $(x)$

(iii) Evaluate $\lim_{x \to 0} \frac{1 - \cos x}{\sin^2 x}$

(iv) Differentiate $\frac{x^2 + 1}{x^2 - 3}$ w.r.t $x$

(v) If $y = x^4 + 2x^2 + 2$, then show that $\frac{dy}{dx} = 4x\sqrt{y - 1}$

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

(vii) Differentiate $x^2 - \frac{1}{x^2}$ w.r.t $x^4$

(viii) If $y = \sin^2 x$, $u = \sin x$, then find $\frac{dy}{du}$

(ix) Find $\frac{dy}{dx}$ if $y = x\cos y$

(x) Find $f'(x) = ?$, if $f(x) = \ell n(e^x + e^{-x})$

(xi) Define Critical Value.

(xii) State the Maclaurin's Series.

**3. Attempt any eight parts.** **$8 \times 2 = 16$**

(i) Find $\delta y$ if $y = x^2 + 2x$ when $x$ changes from 2 to 1.8.

(ii) Evaluate $\int \frac{dx}{\sqrt{x+1} - \sqrt{x}}$, $x > 0$

(iii) Evaluate $\int \sqrt{1 - \cos 2x}\, dx$, $1 - \cos 2x > 0$

(iv) Evaluate $\int \frac{x}{\sqrt{4 + x^2}} dx$

(v) Evaluate $\int \frac{ax}{\sqrt{a^2 - x^4}} dx$

(vi) Evaluate $\int (\ell nx)^2\, dx$

(vii) Evaluate $\int_1^2 \frac{x}{x^2 + 2} dx$

(viii) Evaluate $\int_0^3 \frac{dx}{x^2 + 9}$

(ix) Solve $\sec x + \tan y \frac{dy}{dx} = 0$

(x) Find the area between the $x$-axis and the curve $y = \cos\frac{x}{2}$ from $x = -\pi$ to $\pi$.

(xi) Draw the graph and shade solution region for $5x - 4y \le 20$

(xii) Define Optimal Solution.

P.T.O.

MTN-12-G1-19



4. **Attempt any nine parts.** $9 \times 2 = 18$

(i) Find the mid point of the line segment joining the points $\left(-\sqrt{5}, -\frac{1}{3}\right)$ and $\left(-3\sqrt{5}, 5\right)$

(ii) Find '$K$' so that line joining the points $A(7, 3)$ and $B(K, -6)$ has a slope $\frac{1}{2}$.

(iii) Find the equation of line passing through the point $(-9, 0)$ and has a slop $-4$.

(iv) Define 'Homogeneous equation' of degree $n$ where '$n$' is a positive integer.

(v) Find the equation of circle with centre $(-3, 5)$ and radius 7.

(vi) Find the coordinates of vertex and focus of the parabola $x^2 = 4(y-1)$

(vii) Find the equation of Ellipse having foci $(\pm 3, 0)$ and minor axis of length 10.

(viii) Find the coordinates of foci and vertices of Hyperbola $\frac{x^2}{4} - \frac{y^2}{9} = 1$

(ix) Define "Position Vector" of a point..

(x) If $\left|\alpha \underline{i} + (\alpha + 1)\underline{j} + 2\underline{k}\right| = 3$, then find value of '$\alpha$'.

(xi) Find '$\alpha$' so that the vectors $2\underline{i} + \alpha\underline{j} + 5\underline{k}$ and $3\underline{i} + \underline{j} + \alpha\underline{k}$ are perpendicular.

(xii) Find $\underline{a} \times \underline{b}$ if $\underline{a} = 2\underline{i} + \underline{j} - \underline{k}$ and $\underline{b} = \underline{i} - \underline{j} + \underline{k}$

(xiii) Prove that the vectors $\underline{i} - 2\underline{j} + 3\underline{k}$, $-2\underline{i} + 3\underline{j} - 4\underline{k}$ and $\underline{i} - 3\underline{j} + 5\underline{k}$ are coplanar.

## SECTION-II

**NOTE: - Attempt any three questions.** $3 \times 10 = 30$

5.(a) Prove that $\lim\limits_{\theta \to 0} \frac{\sin\theta}{\theta} = 1$, $\theta$ is measured in radians.

(b) Find the extreme values for the function $f(x) = (x-2)^2(x-1)$

6.(a) Show that $\int \sqrt{a^2 - x^2}\,dx = \frac{a^2}{2} Sin^{-1}\frac{x}{a} + \frac{x}{2}\sqrt{a^2 - x^2} + c$

(b) The points $(4, -2)$, $(-2, 4)$ and $(5, 5)$ are the vertices of a triangle. Find in-centre of the triangle.

7. (a) Evaluate $\int_{\frac{1}{2}}^{\frac{\sqrt{3}}{2}} \frac{Sin^{-1}x}{\sqrt{1-x^2}}\,dx \qquad x \neq 1, -1$

(b) Graph the feasible region of the following system of linear inequalities and find the corner points

$2x - 3y \leq 6$

$2x + 3y \leq 12$

$x \geq 0$

$y \geq 0$

8. (a) Find an equation of the line through the intersection of the lines $x - y - 4 = 0$ and $7x + y + 20 = 0$ and parallel to the line $6x + y - 14 = 0$

(b) Show that the circles $x^2 + y^2 + 2x - 2y - 7 = 0$ and $x^2 + y^2 - 6x + 4y + 9 = 0$ touch externally.

9.(a) Find an equation of the parabola having focus at $(-3, 1)$ and directrix is $x = 3$.

(b) Prove that the line segment joining the mid points of the sides of a quadrilateral taken in order form a parallelogram.

MTN-12-G-19

Paper Code Number: 4192

2019 (A)

Roll No: ____________

**INTERMEDIATE PART-II ($12^{th}$ CLASS)**

**MATHEMATICS PAPER-II**

**GROUP-II**

TIME ALLOWED: 30 Minutes

**OBJECTIVE**

MAXIMUM MARKS: 20

**Note: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that bubble in front of that question number. Use marker or pen to fill the bubbles. Cutting or filling two or more bubbles will result in zero mark in that question. Attempt as many questions as given in objective type question paper and leave others blank. No credit will be awarded in case BUBBLES are not filled. Do not solve questions on this sheet of OBJECTIVE PAPER.**

**Q.No.1**

(1) If $f(x) = x^2 + \cos x$, then $f(x)$ is:-
(A) Constant function (B) Even function (C) Odd function (D) Linear function

(2) If $f(x) = x^3 - 2x^2 + 4x - 1$, then $f(-2)$ :- (A) 14 (B) $-14$ (C) $-25$ (D) 25

(3) $\frac{d}{dx}(4x+7)^9 =$
(A) $36(4x+7)^8$ (B) $36(4x+7)^9$ (C) $28(4x+7)^8$ (D) $63(4x+7)^8$

(4) If $f(x) = 2^{2x}$, then $f'(x) =$
(A) $2^{2x-1}$ (B) $2^{2x}\ell n 2$ (C) $2^{2x+1}\ell n 2$ (D) $\frac{2^{2x}}{\ell n 2}$

(5) $\frac{d}{dx}\left(Cos^{-1}\frac{x}{a}\right) =$
(A) $\frac{1}{1-x^2}$ (B) $\frac{1}{1+x^2}$ (C) $\frac{1}{\sqrt{a^2-x^2}}$ (D) $\frac{-1}{\sqrt{a^2-x^2}}$

(6) If $f(x) = x^{10}$, then $f''(1) =$ (A) 90 (B) 9 (C) 10 (D) 100

(7) $\int \frac{1}{x^2}\,dx =$ (A) $\ell nx + c$ (B) $\ell nx^2 + c$ (C) $\frac{-2}{x^3} + c$ (D) $\frac{-1}{x} + c$

(8) $\int \tan\frac{\pi}{4}\,dx =$ (A) $\ell n\left(\sin\frac{\pi}{4}\right) + c$ (B) $x + c$ (C) $\sec^2\frac{\pi}{4}$ (D) 1

(9) $\int \sec^2 2x\,dx =$ (A) $\frac{1}{2}\tan 2x$ (B) $\tan 2x$ (C) $\frac{1}{2}\tan x$ (D) $2\tan 2x$

(10) $\int_0^{\frac{3\pi}{2}} \cos x\,dx =$ (A) 0 (B) 1 (C) $-1$ (2) 2

(11) Distance of line $5x + 12y + 39 = 0$ from $(0, 0)$ is:- (A) 3 (B) 5 (C) 12 (D) 39

(12) Equation of horizontal line through $(a, b)$ is:-
(A) $y = a$ (B) $y = b$ (C) $x = a$ (D) $x = b$

(13) The line $ax + by + c = 0$ will represent equation of straight line parallel to $y$-axis if:-
(A) $a = 0$ (B) $b = 0$ (C) $c = 0$ (D) $a = b$

(14) Point $\left(+\frac{3}{7}, -\frac{5}{7}\right)$ lies in:- (A) I quadrant (B) II quadrant (C) III quadrant (D) IV quadrant

(15) The point $(1, 2)$ satisfies the inequality:-
(A) $x + 2y > 3$ (B) $x - 2y > 3$ (C) $x - 2y > 5$ (D) $x + 2y < 3$

(16) Radius of circle $x^2 + y^2 + 4x + 2y - 4 = 0$ is:- (A) 3 (B) 2 (C) 4 (D) 1

(17) Latus rectum of parabola $x^2 = 8y$ is:-
(A) $y = -2$ (B) $y = 2$ (C) $x = 2$ (D) $x = -2$

(18) Major axis of ellipse $\frac{x^2}{8} + \frac{y^2}{12} = 1$ is:- (A) $2\sqrt{3}$ (B) 8 (C) $4\sqrt{3}$ (D) 5

(19) Direction cosines of $x$-axis are:- (A) 1, 1, 0 (B) 1, 0, 1 (C) 1, 0, 0 (D) 0, 0, 1

(20) $[\underline{k}\ \underline{i}\ \underline{j}] =$ (A) 3 (B) 0 (C) $-2$ (D) 1

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2019 (A) Roll No: MTN-12-G2-19

INTERMEDIATE PART-II (12[th] CLASS)

MATHEMATICS PAPER-II TIME ALLOWED: 2.30 Hours

GROUP-II **SUBJECTIVE** MAXIMUM MARKS: 80

**NOTE: - Write same question number and its part number on answer book, as given in the question paper.**

## SECTION-I

**2. Attempt any eight parts.** $8 \times 2 = 16$

(i) Find the domain and range of $f(x) = |x-3|$

(ii) If $f(x) = 3x^4 - 2x^2$, $g(x) = \frac{2}{\sqrt{x}}$, $x \neq 0$, find $gof(x)$

(iii) Evaluate $\lim_{\theta \to 0} \frac{1-\cos\theta}{\sin\theta}$

(iv) Differentiate $\frac{2x-3}{2x+1}$ w.r.t $x$.

(v) If $y = (x-5)(3-x)$, then find $\frac{dy}{dx}$

(vi) If $x^2 + y^2 = 4$, then show that $\frac{dy}{dx} = \frac{-x}{\sqrt{4-x^2}}$

(vii) Differentiate $(1+x^2)^n$ w.r.t $x^2$

(viii) If $y = \sin x$, $u = \cot x$, then find $\frac{dy}{du}$

(ix) Show that $\frac{dy}{dx} = \frac{y}{x}$, if $\frac{y}{x} = Tan^{-1}\frac{y}{x}$

(x) Find $f'(x)$, if $f(x) = e^{\sqrt{x}-1}$

(xi) Define Critical Point.

(xii) State the Taylor's Series.

**3. Attempt any eight parts.** $8 \times 2 = 16$

(i) Find $\delta y$ if $y = \sqrt{x}$ when $x$ changes from 4 to 4.41.

(ii) Evaluate $\int \frac{3-\cos 2x}{1+\cos 2x}\,dx$ $(\cos 2x \neq -1)$

(iii) Evaluate $\int \frac{(1+e^x)^3}{e^x}\,dx$

(iv) Evaluate $\int \frac{\cot\sqrt{x}}{\sqrt{x}}\,dx$, $x > 0$

(v) Evaluate $\int \frac{\sec^2 x}{\sqrt{\tan x}}\,dx$

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

(vii) Evaluate $\int_{-2}^{0} \frac{1}{(2x-1)^2}\,dx$

(viii) Evaluate $\int_{1}^{2} \ln x\,dx$

(ix) Solve $\sin y \operatorname{cosec} x \frac{dy}{dx} = 1$

(x) Find Area bounded by cos function from $x = \frac{-\pi}{2}$ to $x = \frac{\pi}{2}$

(xi) Graph the Solution Region for $3x - 2y \geq 6$

(xii) Define "Objective Function".

P.T.O.

MTN-12-G2-19



**4. Attempt any nine parts.** $9 \times 2 = 18$

(i) Find the co-ordinates of the point that divides the join of $A(-6, 3)$ and $B(5, -2)$ in the ratio $2:3$ internally.

(ii) Convert equation $4x + 7y - 2 = 0$ into two intercepts form.

(iii) Show that the point $(-2, 4)$ lies above the line $4x + 5y - 3 = 0$.

(iv) Define 'Medians' of triangle.

(v) Find the slope of tangent to circle $x^2 + y^2 = 25$ at point $(4, 3)$.

(vi) Find the co-ordinates of vertex and focus of the parabola $y = 6x^2 - 1$

(vii) Find the equation of the Ellipse with foci $(\pm 3\sqrt{3}, 0)$ and vertices $(\pm 6, 0)$

(viii) Find the equation of the Hyperbola with the centre $(0, 0)$ Foci $(\pm 6, 0)$ and Vertices $(\pm 4, 0)$.

(ix) If $\overline{AB} = \overline{CD}$. Find the coordinates of the point $A$ when points $B, C, D$ are $(1, 2), (-2, 5), (4, 11)$ respectively.

(x) Find a vector of length 5 in the direction opposite that of $\underline{v} = \underline{i} - 2\underline{j} + 3\underline{k}$.

(xi) Find value of '$\alpha$' so that vectors $\alpha\underline{i} + 2\alpha\underline{j} + \underline{k}$ and $\underline{i} + \alpha\underline{j} + 3\underline{k}$ are perpendicular.

(xii) Define direction angles of a vector.

(xiii) Find $\underline{u} \cdot (\underline{v} \times \underline{w})$ when $\underline{u} = [3, 0, 2]$; $\underline{v} = [1, 2, 1]$ and $\underline{w} = [0, -1, 4]$

## SECTION-II

**NOTE: - Attempt any three questions.** $3 \times 10 = 30$

5.(a) Evaluate $\lim_{\theta \to 0} \dfrac{\tan\theta - \sin\theta}{\sin^3\theta}$

(b) If $x = a\cos^3\theta$, $y = b\sin^3\theta$ show that $a\dfrac{dy}{dx} + b\tan\theta = 0$

6.(a) Evaluate $\displaystyle\int \frac{7x - 1}{(x-1)^2(x\ 1)}\,dx \quad x > 1$

(b) Find equations of the altitudes of the triangle whose vertices are $A(-3, 2)$, $B(5, 4)$, $C(3, -8)$

7. (a) Determine the area bounded by the parabola $y = x^2 + 2x - 3$ and the $x$-axis.

(b) Graph the feasible region of the following system of linear inequalities

$3x + 7y \le 21$

$x - y \le 3$

$x \ge 0$

$y \ge 0$

8. (a) Find the lines represented by $3x^2 + 7xy + 2y^2 = 0$. Also find measure of the angle between them.

(b) Find an equation of the circle that passes through $A(4, 5)$, $B(-4, -3)$, $C(8, -3)$

9.(a) Show that the equation $9x^2 - 18x + 4y^2 + 8y - 23 = 0$ represents an ellipse. Find its elements.

(b) Using vector method, in any triangle $ABC$ prove that $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$