Paper Code Number: 4195	2018 (A)	Roll No: ________

INTERMEDIATE PART-II (12th CLASS)

MATHEMATICS PAPER-II MTN-G1-12-18 TIME ALLOWED: 30 Minutes

GROUP-I **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) Distance of the point $(3, -7)$ from $x-$axis is:- (A) 3 (B) -3 (C) 7 (D) -7

(2) Inclination of a line perpendicular to $y-$axis is:- (A) 0^o (B) 60^o (C) 30^o (D) 90^o

(3) The slope of a line which is perpendicular to the line $ax + by + c = 0$ is:-
(A) $\frac{-a}{b}$ (B) $\frac{b}{a}$ (C) $\frac{-b}{a}$ (D) $\frac{a}{b}$

(4) The point of concurrency of altitudes of a triangle is called:-
(A) In – Centre (B) Orthocentre (C) Circumcentre (D) Centroid

(5) The graph of $2x \geq 3$ lies in:-
(A) Upper Half Plane (B) Lower Half Plane (C) Left Half Plane (D) Right Half Plane

(6) Length of the diameter of the circle $(x+8)^2 + (y-5)^2 = 80$ is:-
(A) 160 (B) $4\sqrt{5}$ (C) $8\sqrt{5}$ (D) 40

(7) Directrix of Parabola $x^2 = -16y$ is:-
(A) $x + 4 = 0$ (B) $x - 4 = 0$ (C) $y - 4 = 0$ (D) $y + 4 = 0$

(8) $x = a\cos\theta,\ \ y = b\sin\theta$ represent:- (A) Circle (B) Parabola (C) Ellipse (D) Hyperbola

(9) A unit vector perpendicular to the vectors $\underline{a}$ and $\underline{b}$ is:-
(A) $\frac{\underline{a} \times \underline{b}}{|\underline{a}||\underline{b}|}$ (B) $\frac{\underline{a} \times \underline{b}}{|\underline{a} \times \underline{b}|}$ (C) $\frac{|\underline{a}||\underline{b}|}{|\underline{a} \times \underline{b}|}$ (D) $\frac{|\underline{a} \times \underline{b}|}{|\underline{a}||\underline{b}|}$

(10) $[\hat{k}\ \hat{i}\ \hat{j}] =$ (A) 1 (B) 2 (C) -1 (D) -2

(11) $Log_e\left(\frac{1}{x} + \frac{\sqrt{1-x^2}}{x}\right) =$ -------- , $0 < x \leq 1$
(A) $Sech^{-1}x$ (B) $Cosech^{-1}x$ (C) $Tanh^{-1}x$ (D) $Coth^{-1}x$

(12) The linear function $f(x) = ax + b$ becomes identity function if:-
(A) $a = 0,\ b = 1$ (B) $a = 1,\ b = 0$ (C) $a = 0,\ b = 0$ (D) $a = 1,\ b = 1$

(13) If $y = e^{f(x)}$ then $y' =$
(A) $e^{f'(x)}.f(x)$ (B) $e^{f(x)}.f'(x)$ (C) $e^{f'(x)}.\log f(x)$ (D) $e^{f'(x)}.f'(x)$

(14) For relative maxima at $x = c$
(A) $f(c) < f(x)$ (B) $f(c) > f(x)$ (C) $f(c) \geq f(x)$ (D) $f(c) \leq f(x)$

(15) If $f'(a-\varepsilon) < 0$ and $f'(a+\varepsilon) < 0$ then at $x = a$ $f(x)$ has:-
(A) Relative Minima (B) Relative Maxima (C) Point of Inflexion (D) Critical Point

(16) $\frac{1}{2}\frac{d}{dx}\left[Tan^{-1}x - Cot^{-1}x\right] =$
(A) $\frac{-1}{1+x^2}$ (B) $\frac{1}{1+x^2}$ (C) $\frac{1}{1-x^2}$ (D) $\frac{-1}{1-x^2}$

(17) $\int \frac{\log_e Tanx}{Sin2x}.dx =$ (A) $\frac{1}{2}(\log_e(Tanx))^2 + c$
(B) $\frac{1}{4}(\log_e(Tanx))^2 + c$ (C) $\frac{1}{2}\log_e(Sin2x)^2 + c$ (D) $\frac{1}{4}\log_e(Sin2x)^2 + c$

(18) $\int e^{-x}(Cosx - Sinx)dx =$
(A) $e^{-x}Sinx + c$ (B) $-e^{-x}Sinx + c$ (C) $e^{-x}Cosx + c$ (D) $-e^{-x}Cosx + c$

(19) $3\int_{\pi/2}^{\pi} Sinx.dx =$ (A) 1 (B) 2 (C) 3 (D) 4

(20) Solution of differential equation $(e^x + e^{-x})\frac{dy}{dx} = e^x - e^{-x}$ is $y =$
(A) $\log_a(e^x + e^{-x}) + c$ (B) $\log_e(e^x + e^{-x}) + c$ (C) $\log_a(e^x - e^{-x}) + c$ (D) $\log_e(e^x - e^{-x}) + c$

MTN-G1-12-18

2018 (A) Roll No: ____________

INTERMEDIATE PART-II (12^{th} 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) Define explicit function and give an example.

(ii) Find $\dfrac{f(a+h)-f(a)}{h}$ and simplify where $f(x) = \cos x$

(iii) Prove that $\lim\limits_{n \to \infty}\left(1+\dfrac{1}{n}\right)^n = e$

(iv) Find by definition, the derivative of $2-\sqrt{x}$ w.r.to 'x'.

(v) Find $\dfrac{dy}{dx}$ if $y = \dfrac{\left(\sqrt{x}+1\right)\left(x^{3/2}-1\right)}{x^{1/2}-1}$, $x \neq 1$

(vi) Differentiate $\left(\sqrt{x}-\dfrac{1}{\sqrt{x}}\right)^2$ w.r.to 'x'.

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

(viii) Differentiate $\tan^3\theta \sec\theta$ w.r.to 'θ'.

(ix) Find $\dfrac{dy}{dx}$ if $x = y\sin y$

(x) Differentiate $(\ell n x)^x$ w.r.to 'x'.

(xi) Find $f'(x)$ if $f(x) = x^3 e^{1/x}$, $x \neq 0$

(xii) Find y_2 if $x^2 + y^2 = a^2$

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

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

(ii) Evaluate $\displaystyle\int \frac{\sin x + \cos^3 x}{Cos^2 x \sin x}\, dx$

(iii) Evaluate $\displaystyle\int \frac{1}{x\,\ell n x}\, dx$

(iv) Evaluate $\displaystyle\int x \sin x \; dx$

(v) Evaluate $\displaystyle\int e^{-x}(\cos x - \sin x)\; dx$

(vi) Evaluate $\displaystyle\int \frac{5x+8}{(x+3)(2x-1)}\, dx$

(vii) State the fundamental theorem of calculus.

(viii) Evaluate $\displaystyle\int_1^2 \frac{x\,dx}{x^2+2}$

(ix) Find the area bounded by the curve $y = 4 - x^2$ and the x-axis.

(x) Solve $\sec^2 x \tan y \, dx + \sec^2 y \tan x \, dy = 0$

(xi) Graph the inequality $3x + 7y \geq 21$

(xii) State the Linear Programming Theorem.

P.T.O

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

(i) Find "h" such that $A(-1, h)$, $B(3, 2)$ and $C(7, 3)$ are collinear.

(ii) Find an equation of the line passing through $(-5, -3)$ and $(9, -1)$.

(iii) Find the area of the region bounded by the triangle with vertices $A(1, 4)$, $B(2, -3)$ and $C(3, -10)$

(iv) Find value of "p" such that lines $2x - 3y - 1 = 0$, $3x - y - 5 = 0$ and $3x + py + 8 = 0$ meet at a point.

(v) Find the lines represented by $6x^2 - 19xy + 15y^2 = 0$

(vi) Find the focus and vertex of the parabola $x^2 - 4x - 8y + 4 = 0$

(vii) Find equation of parabola with focus $(2, 5)$ and directrix $y = 1$

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

(ix) Find an equation of the ellipse with foci $\left(\pm 3\sqrt{3}, 0\right)$ and vertices $\left(\pm 6, 0\right)$.

(x) Find the direction cosines of vector $\underline{v} = \underline{i} - \underline{j} - \underline{k}$

(xi) Find real number "α" so that the vectors $\underline{u} = \alpha\underline{i} + 2\alpha\underline{j} - \underline{k}$ and $\underline{v} = \underline{i} + \alpha\underline{j} + 3\underline{k}$ are perpendicular.

(xii) Find the area of the triangle with vertices $A(1, -1, 1)$, $B(2, 1, -1)$ and $C(-1, 1, 2)$.

(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 coplaner.

SECTION-II

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

5.(a) If θ is measured in Radian, then prove that $\lim_{\theta \to 0} \frac{\sin\theta}{\theta} = 1$

(b) Show that $2^{x+h} = 2^x\left[1 + (\ell n2)h + \frac{(\ell n2)^2}{\underline{|2}}h^2 + \frac{(\ell n2)^3}{\underline{|3}}h^3 + ----\right]$

6.(a) Evaluate the indefinite integral $\int \frac{x^2 + 3x - 34}{x^2 + 2x - 15}\,dx$

(b) Find a joint equation of the lines through the origin and perpendicular to the lines $ax^2 + 2hxy + by^2 = 0$

7. (a) Evaluate the integral $\int_0^1 \frac{3x}{\sqrt{4 - 3x}}\,dx$

(b) Minimize $z = 2x + y$ subject to the constraints $x + y \geq 3$; $7x + 5y \leq 35$; $x \geq 0$; $y \geq 0$

8. (a) Find equations of tangents to the circle $x^2 + y^2 = 2$ which are perpendicular to the line $3x + 2y = 6$

(b) Prove that for any triangle ΔABC $\quad a^2 = b^2 + c^2 - 2bc\ Cos\,A$

9.(a) Discuss and sketch the graph of the equation $25x^2 - 16y^2 = 400$

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

Paper Code Number: 4196	2018 (A) Roll No: ______________

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

MATHEMATICS PAPER-II MTN-G2-12-18 TIME ALLOWED: 30 Minutes

GROUP-II **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) Distance between points $(7, 6)$ and $(3, 3)$ is:- (A) 3 (B) 5 (C) 6 (D) 7

(2) If two lines with slopes m_1, m_2 are parallel then:-
(A) $m_1 = m_2$ (B) $m_1 = -m_2$ (C) $\frac{m_1}{m_2} = 2$ (D) $\frac{m_1}{m_2} = -1$

(3) Slope of line $5x + 7y = 35$ is:- (A) $\frac{5}{7}$ (B) $\frac{7}{5}$ (C) 35 (D) $\frac{-5}{7}$

(4) Equation of line with slope -2, y – intercept 3 is:-
(A) $x - 2y = 3$ (B) $3x + 2y = 2$ (C) $2x + y = 3$ (D) $x + 3y = 2$

(5) _____ point satisfy $x - y < 2$.
(A) $(3, 1)$ (B) $(-1, 1)$ (C) $(1, -1)$ (D) $(0, -2)$

(6) Centre of circle $x^2 + y^2 - 6x + 4y + 13 = 0$ is:-
(A) $(3, -2)$ (B) $(-3, -2)$ (C) $(-3, 2)$ (D) $(3, 2)$

(7) Equation of directrix of $y^2 = -4ax$ is:-
(A) $y = -a$ (B) $y = a$ (C) $x = -a$ (D) $x = a$

(8) Focus of $\frac{x^2}{25} + \frac{y^2}{16} = 1$ is:- (A) $(\pm 4, 0)$ (B) $(\pm 5, 0)$ (C) $(0, \pm 3)$ (D) $(\pm 3, 0)$

(9) $2\underline{i} \times 2\underline{j} \cdot \underline{k} =$ (A) 2 (B) 4 (C) 0 (D) 6

(10) For a vector $\underline{v} = 2\underline{i} + 3\underline{j} - 6\underline{k}$, $Cos\beta =$ (A) $\frac{-6}{7}$ (B) $\frac{2}{7}$ (C) $\frac{3}{7}$ (D) $\frac{-3}{7}$

(11) If $g(x) = \frac{3}{x-1}$, then $gog(4) =$ (A) 3 (B) 1 (C) Undefined (D) 0

(12) $\lim_{\theta \to 0} \frac{Sin 7\theta}{\theta} =$ (A) 0 (B) Undefined (C) 1 (D) 7

(13) $\frac{d}{dx}\left(Cos^{-1} 3x\right) =$ (A) $\frac{3}{\sqrt{1-9x^2}}$ (B) $\frac{-3}{\sqrt{1-9x^2}}$ (C) $\frac{1}{\sqrt{1-9x^2}}$ (D) $\frac{-1}{\sqrt{1-9x^2}}$

(14) $\frac{d}{dx} e^{5x-2} =$ (A) $5e^{5x-2}$ (B) $2e^{5x-2}$ (C) e^{5x-3} (D) $5e^{5x-3}$

(15) $\frac{d^2}{dx^2}\left(Cos h 3x\right) =$ (A) $3\cos h 3x$ (B) $3\sin h 3x$ (C) $-9\cos h 3x$ (D) $9\cos h 3x$

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

(17) $\int \frac{1}{ax + b}\, dx =$
(A) $\ell n(ax + b) + c$ (B) $\frac{1}{a}\ell n(ax + b) + c$ (C) $\frac{1}{b}\ell n(ax + b) + c$ (D) $a\ell n(ax + b) + c$

(18) $\int e^x\left(\frac{1}{x} + \ell n x\right) dx =$ (A) $e^x \ell n x + c$ (B) $\frac{1}{x}e^x + c$ (C) $e^x + c$ (D) $\ell n x + c$

(19) $\int_0^{\pi} Cos\, x\, dx =$ (A) π (B) 2 (C) 1 (D) 0

(20) $\int_2^4 \frac{1}{x}\, dx =$ (A) $\ell n 4$ (B) 4 (C) $\ell n 2$ (D) 2

MIN-G2-12-18 2018 (A) Roll No: ____________

INTERMEDIATE PART-II (12th 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 × 2 = 16**

(i) Evaluate $\lim_{x \to 0} \frac{\sqrt{x+a} - \sqrt{a}}{x}$

(ii) Express $\lim_{n \to \infty} \left(1 + \frac{3}{n}\right)^{2n}$ in terms of number "e".

(iii) Give three conditions for a function $f(x)$ to be continuous at a number 'C'.

(iv) Write any two different notations for the derivative of a function $f(x)$.

(v) Find derivative of $\frac{1}{(az-b)^7}$ w.r.t. z using power rule.

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

(vii) If $y = \sqrt{x} - \frac{1}{\sqrt{x}}$. Show that $2x\frac{dy}{dx} + y = 2\sqrt{x}$

(viii) Find the first derivative of implicit function $y^2 + x^2 - 4x = 5$

(ix) Differentiate x and y w.r.t. 't' if $x = \frac{1-t^2}{1+t^2}$, $y = \frac{2t}{1+t^2}$

(x) Differentiate $Sin^2 x$ w.r.t. $Cos^4 x$

(xi) If $x = a\,Cos^3\theta$, $y = b\,Sin^3\theta$, then show that $a\frac{dy}{dx} + b\tan\theta = 0$

(xii) Find $\frac{dy}{dx}$ if $y = \ell n(\tanh x)$

3. Attempt any eight parts. **8 × 2 = 16**

(i) Find δy and dy when $y = x^2 + 2x$ when x changes from 2 to 1.8.

(ii) Evaluate $\int \frac{e^{2x} + e^x}{e^x}\,dx$

(iii) Evaluate $\int \frac{ax+b}{ax^2+2bx+c}\,dx$

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

(v) Evaluate $\int \frac{1}{x\,\ell n x}\,dx$

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

(vii) Evaluate $\int_1^2 \ell n x\,dx$

(viii) Evaluate $\int e^x(Cosx + Sinx)\,dx$

(ix) Evaluate $\int Tan^{-1}x\,dx$

(x) Find the area bounded by the curve $y = x^3 + 3x^2$ and the $x-$axis.

(xi) Define feasible solution set.

(xii) Graph the inequality $x + 2y < 6$

MTN-G2-12-18

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

(i) Prove that $A(3, 1)$, $B(-2, -3)$ and $C(2, 2)$ are vertices of an isosceles triangle.

(ii) If origin is translated to $O'(-3, 2)$ find new coordinates of $P(-2, 6)$.

(iii) Find the distance of $P(6, -1)$ from the line $6x - 4y + 9 = 0$

(iv) Find equation of line whose slope is -4 and $x-$intercept is -9.

(v) Find equation of each line represented by $20x^2 + 17xy - 24y^2 = 0$

(vi) Find focus, directrix of parabola $y = 6x^2 - 1$

(vii) Find equation of parabola if its focus is (2, 5), directrix $y = 1$

(viii) Find centre and vertices of ellipse $\frac{(2x-1)^2}{16} + \frac{(y+2)^2}{16} = 1$

(ix) Find equation of ellipse with centre (0, 0) focus (0, −3), vertex (0, 4)

(x) Find direction cosine of $\overrightarrow{PQ}$ if $P(2, 1, 5)$, $Q(1, 3, 1)$

(xi) Find unit vector in the direction of the vector $\underline{V} = 2\underline{i} + 6\underline{j}$.

(xii) A force $\underline{F} = 4\underline{i} - 3\underline{k}$, passes through the point $A(2, -2, 5)$. Find the moment of $\underline{F}$ about point $B(1, -3, 1)$

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

SECTION-II

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

5.(a) $$f(x) = \begin{cases} \dfrac{\sqrt{2x+5} - \sqrt{x+7}}{x-2} & \text{if} \quad x \neq 2 \\ k & \text{if} \quad x = 2 \end{cases}$$

Find the value of k so that the function is continuous at $x = 2$.

(b) If $y = e^{ax}\sin bx$, show that $\frac{d^2y}{dx^2} - 2a\frac{dy}{dx} + (a^2 + b^2)y = 0$

6.(a) Evaluate $\int \sqrt{a^2 + x^2}\, dx$

(b) The vertices of a triangle are $A(-2, 3)$, $B(-4, 1)$ and $C(3, 5)$. Find coordinates of the centroid of the triangle.

7. (a) Find the area bounded by the curve $y = x^3 - 4x$ and the $x-$axis.

(b) Maximize $z = 2x + 3y$ subject to the constraints
$3x + 4y \le 12$; $2x + y \le 4$; $4x - y \le 4$; $x \ge 0$; $y \ge 0$

8. (a) Write an equation of the circle that passes through the given points. $A(4, 5)$, $B(-4, -3)$, $C(8, -3)$

(b) Prove that $Cos(\alpha + \beta) = Cos\,\alpha\, Cos\beta - Sin\alpha\, Sin\beta$

9.(a) Find the center, Foci, Eccentricity vertices and equation of directrices of $x^2 - y^2 = 9$

(b) Find the volume of tetrahedron whose vertices are $A(2, 1, 8)$, $B(3, 2, 9)$, $C(2, 1, 4)$ and $D(3, 3, 0)$

16-2018(A)-6500 **(MULTAN)**