Number: 4196   INTERMEDIATE PART-II (12th 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) $\dfrac{m_1}{m_2} = 2$ (D) $\dfrac{m_1}{m_2} = -1$

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

(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 $\dfrac{x^2}{25} + \dfrac{y^2}{16} = 1$ 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) $\dfrac{-6}{7}$ (B) $\dfrac{2}{7}$ (C) $\dfrac{3}{7}$ (D) $\dfrac{-3}{7}$

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

(12) $\displaystyle\lim_{\theta \to 0} \dfrac{Sin7\theta}{\theta} =$ (A) 0   (B) Undefined   (C) 1   (D) 7

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

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

(15) $\dfrac{d^2}{dx^2}\left(Cos h3x\right) =$ (A) $3\cos h3x$ (B) $3\sin h3x$ (C) $-9\cos h3x$ (D) $9\cos h3x$

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

(17) $\displaystyle\int \dfrac{1}{ax + b}\, dx =$

    (A) $\ell n(ax + b) + c$ (B) $\dfrac{1}{a}\ell n(ax + b) + c$ (C) $\dfrac{1}{b}\ell n(ax + b) + c$ (D) $a\ell n(ax + b) + c$

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

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

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

MIN-Gr-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.** $8 \times 2 = 16$

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

(ii)   Express $\displaystyle \lim_{n \to \infty} \left(1 + \frac{3}{n}\right)^{2n}$ 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 $\dfrac{1}{(az-b)^7}$ w.r.t. z using power rule.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(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 $x + 2y < 6$

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 $\dfrac{(2x - 1)^2}{16} + \dfrac{(y + 2)^2}{16} = 1$

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

(x) Find direction cosine of $\overline{PQ}$ 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 $\dfrac{d^2 y}{dx^2} - 2a\dfrac{dy}{dx} + (a^2 + b^2)y = 0$

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
$3x + 4y \leq 12$; $2x + y \leq 4$; $4x - y \leq 4$; $x \geq 0$; $y \geq 0$

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 $D(3, 3, 0)$