

MATHEMATICS
GROUP FIRST

PAPER CODE - 8191

12th CLASS - 12019

TIME: 30 MINUTES

OBJECTIVE

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 circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question.

QUESTION NO. 1

- (1) If $f(-x) = -f(x)$, then $f(x)$ is called
(A) Linear function (B) Parametric function (C) Even function (D) Odd function
- (2) $\lim_{\theta \rightarrow 0} \frac{1 - \cos p\theta}{1 + \cos p\theta}$ equals
(A) 1 (B) 0 (C) -1 (D) 2
- (3) $\lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a}$ equals
(A) $f(a)$ (B) $f'(x)$ (C) $f'(0)$ (D) $f'(x)$
- (4) The derivative of $e^{\sin x}$, w.r.t x will be equal to
(A) $e^{\cos x}$ (B) $e^{\sin x}$ (C) $e^{\sin x} \cdot \cos x$ (D) $e^{\sin x} \cdot \sin x$
- (5) $\frac{d}{dx} \cosh(2x)$ equals
(A) $2 \sinh 2x$ (B) $-2 \sinh 2x$ (C) $2 \sinh x$ (D) $-2 \sinh x$
- (6) Second term in Maclaurin Series expansion of $f(x) = e^x$ equals
(A) 1 (B) x^2 (C) x (D) x^3
- (7) $\int \frac{1}{\sqrt{a^2 - x^2}} dx$; $-a < x < a$; equals
(A) $\cos^{-1}\left(\frac{x}{a}\right) + c$ (B) $\sin^{-1}\left(\frac{x}{a}\right) + c$ (C) $\frac{1}{a} \cos^{-1}\left(\frac{x}{a}\right) + c$ (D) $\frac{1}{a} \sin^{-1}\left(\frac{x}{a}\right) + c$
- (8) $\int \frac{1}{1 + \cos x} dx$ equals
(A) $\cot\left(\frac{x}{2}\right) + c$ (B) $\cot\left(\frac{2}{x}\right) + c$ (C) $\tan\left(\frac{2}{x}\right) + c$ (D) $\tan\left(\frac{x}{2}\right) + c$
- (9) $\int_0^1 (5x^4 - 3x^2 + 1) dx$ equals
(A) 1 (B) 2 (C) 0 (D) 3
- (10) If $x \frac{dy}{dx} - y = 0$ then y equals
(A) x^2 (B) $\frac{x^2}{c}$ (C) cx (D) $\frac{c}{x}$
- (11) If distance between two points (3,1) and (k, 2) is '1', then value of 'k' will be
(A) -3 (B) 3 (C) 1 (D) 2
- (12) Slope - intercept form of line will be
(A) $\frac{x}{a} + \frac{y}{b} = 1$ (B) $x \cos \theta + y \sin \theta = p$ (C) $y - y_1 = m(x - x_1)$ (D) $y = mx + c$
- (13) If the line $\frac{x}{a} + \frac{y}{3} = 1$ is parallel to the line $3x - 2y + 4 = 0$, then value of 'a' equals
(A) -2 (B) 2 (C) 3 (D) 4
- (14) The point of intersection of two lines $x - 2y + 1 = 0$ and $x + 3y - 4 = 0$ is
(A) (-1, -1) (B) (-1, 1) (C) (1, 1) (D) (1, -1)
- (15) Feasible region of inequalities is always restricted to the quadrant
(A) II (B) I (C) III (D) IV
- (16) The equation of directrix of parabola $y^2 = 4ax$ will be equal to
(A) $y + a = 0$ (B) $y - a = 0$ (C) $x - a = 0$ (D) $x + a = 0$
- (17) If the line $6x + 4y + c = 0$ passes through the centre of circle $x^2 + y^2 + 2x + 3 = 0$, then value of 'c' will be
(A) -6 (B) 6 (C) -4 (D) 4
- (18) The co-ordinates of vertices of hyperbola $\frac{x^2}{4} - \frac{y^2}{9} = 1$ will be
(A) (0, ± 3) (B) (± 3 , 0) (C) (0, ± 2) (D) (± 2 , 0)
- (19) The area of triangle with a and b as its adjacent sides equals
(A) $\frac{1}{2} |a \times b|$ (B) $2 |a \times b|$ (C) $\frac{1}{2} (a \times b)$ (D) $2 (a \times b)$
- (20) If $\underline{a}$ and $\underline{b}$ are two non zeros vectors, then the angle between $\underline{a}$ and $\underline{a} \times \underline{b}$ equals
(A) $\frac{\pi}{6}$ (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{2}$ (D) $\frac{2\pi}{3}$

SECTION-I

QUESTION NO. 2 Write short answers any Eight (8) questions of the following

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1	Given $f(x) = x^3 - 2x^2 + 4x - 1$, find the value of $f(1+x)$
2	Evaluate $\lim_{\theta \rightarrow 0} \frac{1 - \cos \theta}{\sin \theta}$
3	If $f(x) = \begin{cases} x+2, & x \leq -1 \\ c+2, & x > -1 \end{cases}$ Find $\lim_{x \rightarrow -1} f(x)$
4	Find $\frac{dy}{dx}$ if $y = (x^2+5)(x^3+7)$
5	Find $\frac{dy}{dx}$ if $y^2 + x^2 - 4x = 5$
6	Differentiate $(1+x^2)^n$ w.r.t. x^2
7	Differentiate w.r.t. x $\cos^{-1} \frac{x}{a}$
8	Define stationary point of a function.
9	Find $\frac{dy}{dx}$ if $y = \ln \tanh x$
10	Find $\frac{dy}{dx}$ if $y = \sqrt{x} + \sqrt{x}$
11	Find $\frac{dy}{dx}$ if $y = x \cos y$
12	Find y_2 if $x^2 + y^2 = a^2$

QUESTION NO. 3 Write short answers any Eight (8) questions of the following

16

1	Find δy if $y = x^2 + 2x$ when x changes from 2 to 1.8
2	Use differentials, find the approximate value of $\sqrt[3]{17}$
3	Evaluate $\int 3^{2x} dx$
4	Evaluate $\int \frac{1}{\sqrt{x}(\sqrt{x}+1)} dx$, $x > 0$
5	Evaluate $\int \frac{x}{x+2} dx$
6	Evaluate $\int \frac{e^x}{e^x+3} dx$
7	Evaluate $\int \frac{\cos x}{\sin x \ln \sin x} dx$
8	Evaluate $\int \frac{e^{\tan^{-1} x}}{(1+x^2)} dx$
9	Write fundamental theorem of calculus
10	Evaluate $\int_{-1}^3 (x^3 + 3x^2) dx$
11	Define Problem constraints.
12	Graph the solution set of $2x + 1 \geq 0$

QUESTION NO. 4 Write short answers any Nine (9) questions of the following

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1	Show that for the points A(3,1), B(-2,-3) and C(2,2), $ AB = BC $
2	The length of perpendicular from the origin to a line is 5 units and the inclination of this perpendicular is 120° . Find the slope and y, intercepts of the line.
3	Find distance from the point P(6,-1) to the line $6x - 4y + 9 = 0$
4	Determine the value of p, such that the lines $2x - 3y - 1 = 0$, $3x - y - 5 = 0$ and $3x + py + 8 = 0$ are concurrent.
5	Find an equation of the circle having the join of A(x_1, y_1) and B(x_2, y_2) as a diameter.
6	Find the focus and directrix of the Parabola $y^2 = 8x$
7	Find eccentricity of the ellipse $4x^2 + 9y^2 = 36$
8	Find the points of intersection of the conics $x^2 + y^2 = 8$ and $x^2 - y^2 = 1$
9	Prove that the vectors $\hat{i} - 2\hat{j} + 3\hat{k}$, $-2\hat{i} + 3\hat{j} - 4\hat{k}$ and $\hat{i} - 3\hat{j} + 5\hat{k}$ are coplanar.
10	If $\vec{a} + \vec{b} + \vec{c} = 0$, then prove that $\vec{a} \times \vec{b} = \vec{b} \times \vec{c} = \vec{c} \times \vec{a}$
11	Calculate the projection of $\vec{a}$ along $\vec{b}$ when $\vec{a} = 3\hat{i} + \hat{j} - \hat{k}$, $\vec{b} = -2\hat{i} - \hat{j} + \hat{k}$
12	Define scalar and vector product of two vectors.
13	Define a unit vector.

(P.T.O)

Note: Attempt any Three questions from this section

10 x 3 = 30

Q.5- (A)	Prove that $\lim_{n \rightarrow \infty} \left(1 + \frac{1}{n}\right)^n = e$
(B)	Show that $\cos(x+h) = \cos x - h \sin x - \frac{h^2}{2!} \cos x + \frac{h^3}{3!} \sin x + \dots$ Also evaluate $\cos 61^\circ$.
Q.6- (A)	Evaluate $\int \frac{dx}{\sqrt{x+a} + \sqrt{x+b}}$ $x+a > 0$ $x+b > 0$
(B)	The points A (-1,2) , B (6,3) and C (2,-4) are vertices of a triangle show that the line joining midpoint D of AB and midpoint E of AC is parallel to BC and $DE = \frac{1}{2} BC$
Q.7-(A)	Solve the differential equation $x dy + y (x-1) dx = 0$
(B)	Graph the feasible region of the system of linear inequalities and find the corner points $2x - 3y \leq 6$, $2x + 3y \leq 12$, $x \geq 0$, $y \geq 0$
Q.8-(A)	Find the co-ordinates of the vertices of the triangle formed by the lines: $x - 2y - 6 = 0$; $3x - y + 3 = 0$; $2x + y - 4 = 0$ Also find measures of the angles of the triangle.
(B)	Find equation of the tangent to the circle $x^2 + y^2 = 2$ and parallel to the line $3x + 2y = 6$
Q.9-(A)	Show that the equation $9x^2 - 18x - 4y^2 + 8y - 23 = 0$ represents an ellipse. Find its centre , foci and eccentricity .
(B)	Prove that four points A (-3 , 5 , -4) , B (-1 , 1 , 1) , C (-1 , 2 , 2) and D (-3 , 4 , -5) are coplanar.