DGK.

II ... 2019

PAPER CODE - 8191
12th CLASS – 12019

MATHEMATICS
GROUP FIRST

OBJECTIVE

TIME: 30 MINUTES
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) $\lim_{\theta \to 0} \frac{1-\cos p\theta}{1+\cos p\theta}$ equals
(A) 1 (B) 0 (C) −1 (D) 2

(3) $\lim_{x \to a} \frac{f(x)-f(a)}{x-a}$ 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) $e^{\sin x}.\cos x$ (D) $e^{\sin x}.\sin x$

(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) $\cos^{-1}\left(\frac{x}{a}\right)\frac{x}{a} + c$ (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) c x (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 $\underline{a}$ and $\underline{b}$ as its adjacent sides equals
(A) $\frac{1}{2}|\underline{a} \times \underline{b}|$ (B) $2|\underline{a} \times \underline{b}|$ (C) $\frac{1}{2}(\underline{a} \times \underline{b})$ (D) $2(\underline{a} \times \underline{b})$

(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) $\frac{2\pi}{3}$

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MATHEMATICS
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SUBJECTIVE

TIME : 2.30 HOURS
MARKS : 80

SECTION-I

QUESTION NO. 2 Write short answers any Eight (8) questions of the following 16

1	Given $f(x) = x^3 - 2x^2 + 4x - 1$, find the value of $f(1+x)$
2	Evaluate $\lim\limits_{\theta \to 0} \frac{1-\cos\theta}{\sin\theta}$
3	If $f(x) = \begin{cases} x+2, & x \le -1 \\ c+2, & x > -1 \end{cases}$ Find $\lim\limits_{x \to -1} f(x)$
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 $\sqrt[4]{17}$
3	Evaluate $\int 3^{\lambda x}\, dx$
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 $\int \frac{e^{m\tan^{-1}x}}{(1+x^2)}\, dx$
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 $2x + 1 \ge 0$

QUESTION NO. 4 Write short answers any Nine (9) questions of the following 18

1	Show that for the points A(3,1) , B(-2,-3) and C(2, 2) , $\lvert AB \rvert = \lvert BC \rvert$
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 $\hat{\imath} - 2\hat{\jmath} + 3\hat{k}$, $-2\hat{\imath} + 3\hat{\jmath} - 4\hat{k}$ and $\hat{\imath} - 3\hat{\jmath} + 5\hat{k}$ 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 $\vec{a} = 3\hat{\imath} + \hat{\jmath} - \hat{k}$, $\vec{b} = -2\hat{\imath} - \hat{\jmath} + \hat{k}$
12	Define scalar and vector product of two vectors.
13	Define a unit vector.

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QUESTION NO. 1

(1) The area of a circle of unit radius is nearly
(A) 3.1 (B) 3.14 (C) 3.142 (D) $\frac{\pi}{2}$

(2) $\lim_{n \to \infty} \left(1 - \frac{1}{n}\right)^n =$
(A) e (B) $\frac{1}{e}$ (C) n (D) $\frac{1}{n}$

(3) $\lim_{h \to 0} \frac{f(a+h) - f(a)}{h} =$
(A) f (a) (B) $f'(a+h)$ (C) $f'(x)$ (D) $f'(a)$

(4) $\frac{d}{dx}(\tan h^{-1} x =$
(A) $\frac{1}{1+x^2}$ (B) $\frac{1}{1-x^2}$ (C) $\frac{1}{\sqrt{1+x^2}}$ (D) $\frac{1}{\sqrt{1-x^2}}$

(5) The derivative of $y = \log_a^x$ w. r. t . x is
(A) $\frac{1}{x}$ (B) $\frac{1}{x \ln a}$ (C) $\frac{\ln a}{x}$ (D) x ln a

(6) $f(x) = (1+x)^n$, $f'(0)$ will be
(A) 0 (B) n (C) 1 (D) n!

(7) $\int a^x dx =$
(A) $\frac{1}{x}$ (B) $\frac{a^x}{\ln a}$ (C) $\ln a . a^x$ (D) 0

(8) $\int_{-\pi}^{\pi} \sin x \, dx =$
(A) 0 (B) $\frac{\pi}{2}$ (C) π (D) $\frac{3\pi}{2}$

(9) $\int_a^x 3t^2 . dt =$
(A) $x^3 - a^3$ (B) t^3 (C) $t^3 - a^3$ (D) 0

(10) The order of $x \frac{d^2y}{dx^2} + \frac{dy}{dx} - 3x = 0$ is
(A) 0 (B) - 3 (C) 1 (D) 2

(11) The non-negative constrains are called
(A) Decision Variables (B) Feasible Solution set (C) Optimal Solution (D)Associated Equation

(12) Equation of a non vertical line with slope m and y intercept zero is
(A) $y = x$ (B) $y = mx$ (C) $y = mx + c$ (D) $y = 0$

(13) The lines $ax^2 + 2hxy + by^2 = 0$ will be parallel if
(A) $h^2 < ab$ (B) $h^2 = ab$ (C) $h^2 > ab$ (D) $a+b = 2$

(14) The centriod of the triangle Δ ABC with vertices A(0,0), B(1,0), C(3,4) is
(A) (0 , 0) (B) (1 , 1) (C) (2 , 2) (D) $(\frac{4}{3}, \frac{4}{3})$

(15) The distance of the line $2x - 5y + 13 = 0$ from the point (0 , 0) is
(A) 13 (B) 10 (C) 4 (D) $\frac{13}{\sqrt{29}}$

(16) The radius of the circle $x^2 + y^2 + 4x - 6y - 3 = 0$
(A) 7 (B) 10 (C) 4 (D) 6

(17) $x . y = 1$ represents
(A) Circle (B) Parabola (C) Ellipse (D) Hyperbola

(18) A solution of the inequality $x + 2y < 6$ is
(A) (1, 1) (B) (4, 4) (C) (6, 2) (D) (5, 4)

(19) A force $\vec{F}$ is applied at an angle of measure $\frac{\pi}{2}$ with the displacement vector $\vec{r}$. The work done will be
(A) $\vec{F} \times \vec{r}$ (B) $\frac{\pi}{2}$ (C) 0 (D) infinite

(20) The projection of a vector $\vec{b}$ along $\vec{a}$ is
(A) $\frac{\vec{a} . \vec{b}}{|a|}$ (B) $\frac{\vec{a} . \vec{b}}{|b|}$ (C) $\vec{a} . \vec{b}$ (D) $\frac{\vec{a}}{\vec{b}}$

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SECTION-I

QUESTION NO. 2 Write short answers any Eight (8) questions of the following 16

1	Define odd and even functions.
2	Find $f^{-1}(x)$ if $f(x) = 3x^3 + 7$
3	Evaluate $\lim\limits_{x \to \pi} \frac{\sin x}{\pi - x}$
4	Find $\frac{dy}{dx}$ if $y = (\sqrt{x} - \frac{1}{\sqrt{x}})^2$
5	Find $\frac{dy}{dx}$ if $xy + y^2 = 2$
6	Differentiate $x^2.\sec 4x$ w.r.t. " x".
7	Find $\frac{dy}{dx}$ if $y = \ln(x + \sqrt{x^2 + 1})$
8	Find y_2 if $x^3 - y^3 = a^3$
9	Define stationary point.
10	Find $\frac{dy}{dx}$, if $y = \tan h^{-1}(\sin x)$
11	Find extreme values for $f(x) = x^2 - x - 2$
12	Prove that $e^{2x} = 1 + 2x + \frac{4x^2}{2!} + \ldots\ \ldots$ by Maclauren Series expansion

QUESTION NO. 3 Write short answers any Eight (8) questions of the following 16

1	Find dy for $y\sqrt{x}$ when x changes from 4 to 4.41
2	Using differentials find $\frac{dy}{dx}$ for $x^4 + y^2 = xy^2$
3	Evaluate $\int \frac{3 - \cos 2x}{1 + \cos 2x}\, dx$
4	Evaluate $\int \frac{\sqrt{y}\,(y+1)}{y}\, dy$, $y > 0$
5	Evaluate $\int \frac{\sec^2 x}{\sqrt{\tan x}}\, dx$
6	Evaluate $\int x \tan^2 x\, dx$
7	Evaluate $\int x^3 \ln x\, dx$
8	Evaluate $\int e^{-x}(\cos x - \sin x)\, dx$
9	Evaluate $\int_0^{\pi/4} \sec x(\sec x + \tan x)\, dx$
10	Evaluate $\int_{-1}^{1} (x + \frac{1}{2})\sqrt{x^2 + x + 1}\, dx$
11	Define order of a differential equation.
12	Graph the solution set of linear inequality $3x - 2y \geq 6$

QUESTION NO. 4 Write short answers any Nine (9) questions of the following 18

1	Show that the lines $2x+y-3=0$ and $4x+2y+5=0$ are parallel.
2	Transform the equation $5x - 12y + 39 = 0$ into normal form.
3	Check whether the point P(5,-8) lies above or below the line $3x + 7y + 15 = 0$
4	Find the distance between the points A (3, 1), B(-2, -4) .
5	Find the centre and radius of the circle $4x^2 + 4y^2 - 8x + 12y - 25 = 0$
6	Find the focus and the vertex of the parabola $x^2 = 5y$
7	Find the point of intersection of the conics $x^2 + y^2 = 8$ and $x^2 - y^2 = 1$
8	Find an equation of hyperbola with foci $(0, \pm 6)$, $e = 2$.
9	Find a unit vector in the direction of $\underline{V} = \underline{i} + 2\underline{j} - \underline{k}$
10	Find a vector perpendicular to $\underline{a} = \underline{i} + \underline{j}$ and $\underline{b} = \underline{i} - \underline{j}$
11	If $\underline{U} = 2\underline{i} - \underline{j} + \underline{k}$ and $\underline{V} = -\underline{i} + \underline{j}$ then find $\underline{U}.\underline{V}$
12	Define scalar triple product.
13	If $\underline{U} = 2\underline{i} + 3\underline{j} + \underline{k}$, $\underline{V} = 4\underline{i} + 6\underline{j} + 2\underline{k}$ then find $\lvert \underline{U} + 2\underline{V} \rvert$

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