DGK-G2-12-19

PAPER CODE - 8192
12^{th} CLASS – 12019

MATHEMATICS
GROUP SECOND

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) 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) $\frac{d}{dx}(\tanh^{-1} x) =$
(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) $\frac{\vec{a} . \vec{b}}{|\vec{a}|}$ (B) $\frac{\vec{a} . \vec{b}}{|\vec{b}|}$ (C) $\vec{a} . \vec{b}$ (D) $\frac{\vec{a}}{\vec{b}}$

DGK-G2-12-19

MATHEMATICS
GROUP SECOND

12th CLASS - 12019
SUBJECTIVE
SECTION-I

TIME : 2.30 HOURS
MARKS : 80

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

1	Define odd and even functions.
2	Find $f'(x)$ if $f(x) = 3x^3 + 7$
3	Evaluate $\lim_{x \to \pi} \frac{\sin x}{\pi - x}$
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 $e^{2x} = 1 + 2x + \frac{4x^2}{2!} + \ldots\ldots\ldots$ 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 $\lvert \underline{U} + 2\underline{V} \rvert$

(P.T.O)

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SECTION-II

Note: Attempt any Three questions from this section **10 x 3 = 30**

Q.5-(A)	Find the graphical solution of the equation $x = \sin 2x$
(B)	Show that $\frac{dy}{dx} = \frac{y}{x}$ if $\frac{y}{x} = \tan^{-1}\frac{x}{y}$
Q.6-(A)	Find $\int \sqrt{a^2 - x^2}\, dx$
(B)	Three points A (7, -1), B (-2, 2) and (1,1) are consecutive vertices of parallelogram. Find the fourth vertex
Q.7-(A)	Solve the differential equation $(y - x\frac{dy}{dx}) = 2(y^2 + \frac{dy}{dx})$
(B)	Graph the feasible region and find the corner points $x + 3y \leq 15$, $2x + y \leq 12$, $x \geq 0$, $y \geq 0$
Q.8-(A)	Check whether the lines $4x - 3y - 8 = 0$; $3x - 4y - 6 = 0$ and $x - y - 2 = 0$ are concurrent. If so, find the point where they meet
(B)	Find the equations of tangents drawn from point (0, 5) to the circle $x^2 + y^2 = 16$
Q.9-(A)	Show that an equation of parabola with focus at $(a\cos\alpha, a\sin\alpha)$ and directrix $x\cos\alpha + y\sin\alpha + a = 0$ is $(x\sin\alpha - y\cos\alpha)^2 = 4a(x\cos\alpha + y\sin\alpha)$
(B)	Find area of the triangle with vertices A (1, -1, 1), B (2, 1, -1) and C (-1, 1,2)