DGK-G1-12-18

PAPER CODE - 8191
(12th CLASS - 12018)

MATHEMATICS , GROUP FIRST TIME: 30 MINUTES , MARKS: 20

OBJECTIVE

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 $f(x) = \sqrt{x+4}$, then $f(4) =$ (A) 8 (B) 16 (C) $\sqrt{2}$ (D) $2\sqrt{2}$

(2) If $f(x) = -2x + 6$, then $f^{-1}(x) =$ (A) $6 - 2x$ (B) $\frac{6-x}{2}$ (C) $\frac{2}{6-x}$ (D) $2x - 6$

(3) $\frac{d}{dx}[g(x)]^{-1} =$ (A) $-[g(x)]^{-2}$ (B) $-[g'(x)]^{-2}$ (C) $-g'(x)[g(x)]^{-2}$ (D) $\frac{-g(x)}{[g(x)]^2}$

(4) $\frac{d}{dx}(\text{Cosec } x) =$ (A) $-\text{Cosec}^2 x$ (B) $-\text{Cosec } x \text{ Cot } x$ (C) $-\text{Cosec}^2 x \text{ Cot } x$ (D) $-\text{Cot}^2 x$

(5) $\frac{d}{dx}(a^{\sqrt{x}}) =$ (A) $a^{\sqrt{x}}.\ln a$ (B) $\frac{a^{\sqrt{x}}}{\ln a}$ (C) $\frac{a^{\sqrt{x}}.\ln a}{2\sqrt{x}}$ (D) $\frac{a^{\sqrt{x}}}{2\sqrt{x}\ln a}$

(6) Geometrically $\frac{dy}{dx}$ means
(A) Tangent of slope (B) Slope of tangent (C) Slope of line (D) Slope of x-axis

(7) If $V = x^3$, then differential of V is (A) $3x^2\,dx$ (B) $3x^2$ (C) $x^3\,dx$ (D) $3x^2\,dv$

(8) $\int (x^2+3x)\,dx =$ (A) $\frac{x^3}{3} + \frac{3x^2}{2} + c$ (B) $x^2 + 3x + c$ (C) $2x+3+c$ (D) $2x+3$

(9) $\int \text{Sin } x\,dx =$ (A) Cos x (B) Cos x+c (C) - Cos x+c (D) $\frac{\text{Sin}^2 x}{2} + c$

(10) $\int (m+1)[x^2+2x]^m (2x+2)\,dx =$
(A) $(x^2+2x)^{m+1}+c$ (B) $\frac{(x^2+2x)^{m+1}}{m+1}+c$ (C) $(x^2+2x)^{m-1}+c$ (D) $m(x^2+2x)^{m-1}+c$

(11) The distance of the point (3,7) from x-axis is (A) 7 (B) 3 (C) – 3 (D) -7

(12) If the distance of the point (5,x) from x-axis is 3 , then x =
(A) 7 (B) 5 (C) 3 (D) - 5

(13) If (3,5) is the midpoint of (5,y) , (x ,7) then x = ? and y = ?
(A) y = 1 , x = 1 (B) y = - 4 , x = - 3 (C) y = 3 , x = 1 (D) y = - 2 , x = -5

(14) The slope of line with inclination 60° is (A) 0 (B) $\frac{1}{\sqrt{3}}$ (C) 1 (D) $\sqrt{3}$

(15) $2x - 8 \leq 0$ is (A) equation (B) identity (C) inequality (D) curve

(16) The radius of circle $(x-5)^2 + (y-3)^2 = 8$ is (A) 64 (B) 4 (C) $2\sqrt{2}$ (D) 2

(17) The line $y = mx + c$ is tangent to the parabola $y^2 = 4ax$ if c = ?
(A) $\frac{m}{a}$ (B) $\frac{-b}{a}$ (C) $\frac{a}{m}$ (D) $\frac{1}{ma}$

(18) The foci of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ are
(A) $(\pm a, 0)$ (B) $(0, \pm a)$ (C) $(0, \pm ae)$ (D) $(\pm ae, 0)$

(19) The angle between the vectors $2\hat{i} + 3\hat{j} + \hat{k}$ and $2\hat{i} - \hat{j} - \hat{k}$ is
(A) 30° (B) 45° (C) 60° (D) 90°

(20) If the vectors $2\alpha\hat{i} + \hat{j} - \hat{k}$ and $\hat{i} + \alpha\hat{j} + 4\hat{k}$ are perpendicular to each other , then value of " α " is
(A) 3 (B) $\frac{1}{3}$ (C) $\frac{2}{3}$ (D) $\frac{4}{3}$

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DGK-G1-12-18

MATHEMATICS , GROUP FIRST

12th CLASS - 12018

SUBJECTIVE

SECTION-I

TIME : 2.30 HOURS
MARKS : 80

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

1	Express the volume " V " of a cube as a function of the area " A " of its base
2	Determine whether the function f is even or odd $f(x) = x^3 + x$
3	$\lim_{\theta \to 0} \frac{\sin\theta}{\pi-\theta}$ and θ in radian
4	Differentiate $\frac{2x-3}{2x+1}$ w.r.t. x.
5	If $x = 1 - t^2$ and $y = 3t^2 - 2t^3$, then find $\frac{dx}{dt}$ and $\frac{dy}{dt}$
6	Find $\frac{dy}{dx}$ if $y = (3x^2 - 2x + 7)^6$
7	Differentiate $(1+x^2)^n$ w.r.t. x^2
8	Show that $\frac{d}{dx}(\text{Cosec}^{-1}x) = \frac{-1}{x\sqrt{x^2-1}}$, for $x > 1$
9	Differentiate $\text{Sin}^{-1}\sqrt{1-x^2}$ w.r.t.x
10	Find $\frac{dy}{dx}$ if $y = xe^{\sin x}$
11	Find y_4 if $y = \text{Cos}^3 x$
12	Apply Maclaurin series expansion to prove that $e^x = 1+x+\frac{x^2}{2!}+\frac{x^3}{3!}+\ldots\ldots\ldots$

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

1	Evaluate $\int \frac{\sin x+\cos^3 x}{\cos^2 x \sin x} dx$
2	Evaluate $\int \frac{1-x^2}{1+x^2} dx$
3	Evaluate $\int \frac{\cot\sqrt{x}}{\sqrt{x}} dx$
4	Evaluate $\int \frac{1}{(1+x^2)^{3/2}} dx$
5	Evaluate $\int x^4 \ln x \, dx$
6	Evaluate $\int e^x (\cos x + \sin x) dx$
7	Evaluate $\int_1^{\sqrt{5}} \sqrt{(2t-1)^3}\, dt$
8	Solve the differential equation $\sec x + \tan y \frac{dy}{dx} = 0$
9	Find area between x-axis and the curve $y = \cos\frac{x}{2}$: $x = -\pi$ to π
10	Evaluate $\int \frac{1}{\sqrt{a^2+x^2}} dx$
11	Define Convex Region
12	Indicate the solution set for $3x + 7y \geq 21$ $x - y \leq 2$

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

1	Find h So that the points $A(\sqrt{3}, -1)$ $B(0, 2)$ and $C(h, -2)$ are collinear
2	Find the slope and inclination of the line joining the points (3 , - 2) and (2 , 7)
3	Find an equation of the line through (- 4 , - 6) and perpendicular to a line having slope -3/2
4	Find whether the point (5 , 8) lies above or below the line $2x - 3y + 6 = 0$
5	Find the measure of the angle between the two lines , $2x^2 + 3xy - 5y^2 = 0$
6	Find the focus and vertex of the parabola $y^2 = 8x$
7	Find an equation of the parabola with Focus (- 3 , 1) and directrix $x = 3$
8	Find an equation of the ellipse having centre at (0 , 0) , focus at (0 , - 3) and one vertex at (0 , 4)
9	Find the foci and vertices of ellipse $25x^2 + 9y^2 = 225$
10	Find the angle between the vectors $\underline{u} = 2\underline{i} - \underline{j} + \underline{k}$ and $\underline{V} = -\underline{i} + \underline{j}$
11	Prove that $\cos(\alpha + \beta) = \cos\alpha \cos\beta - \sin\alpha \sin\beta$
12	Find a vector perpendicular to each of the vectors $\underline{a} = 2\underline{i} + \underline{j} + \underline{k}$ and $\underline{b} = 4\underline{i} + 2\underline{j} - \underline{k}$
13	Find the value of $2\underline{i} \times 2\underline{j} \cdot \underline{k}$

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SECTION-II

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

5-(A)	If $f(x) = \begin{cases} \frac{\sqrt{2x+5}-\sqrt{x+7}}{x-2} & , \quad x \neq 2 \\ k & , \quad x = 2 \end{cases}$ find value of k so that "f" is continuous at $x = 2$
(B)	Show that $2^{x+h} = 2^x [1+(\ln 2)h+(\ln 2)^2 \frac{h^2}{2!} + (\ln 2)^3 \frac{h^3}{3!} + \ldots\ldots\ldots]$
6-(A)	Evaluate the integral $\int \text{Cosec}^3 x.\ dx$
(B)	Find the equations of two parallel lines perpendicular to $2x - y + 3 = 0$ such that the product of x – and y – intercepts of each is 3
7-(A)	Evaluate $\int_0^3 \frac{dx}{x^2+9}$
(B)	Minimize $Z = 3x + y$ subject to the constraints $3x + 5y \geq 15$, $x + 6y \geq 9$, $x \geq 0$, $y \geq 0$
8-(A)	Show that the circles $x^2 + y^2 + 2x - 2y - 7 = 0$ and $x^2 + y^2 - 6x + 4y - 9 = 0$ touch externally
(B)	Prove that in any triangle Δ ABC $a^2 = b^7 + c^2 - 2bc \text{ Cos } A$
9-(A)	Find equation of the hyperbola with centre (0,0) focus (6,0) Vertex (4,0)
(B)	Prove that the points whose position vectors are $A(-6\underline{i} + 3\underline{j} + 2\underline{k})$, $B(3\underline{i} - 2\underline{j} + 4\underline{k})$, $C(-5\underline{i} + 7\underline{j} + 3\underline{k})$, $D(-13\underline{i} + 17\underline{j} - \underline{k})$ are coplanar

DGK-G2-12-18

PAPER CODE - 8192
(12th CLASS - 12018)

MATHEMATICS , GROUP SECOND

TIME: 30 MINUTES , MARKS: 20

OBJECTIVE

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) Domain of $f(x) = \frac{x-1}{x-4}$ is (A) 4 (B) 1 (C) R-{1} (D) R-{4}

(2) $\lim_{x\to 0} \frac{\text{Sin } ax}{\text{Sin } bx}$ (A) $\frac{a}{b}$ (B) $\frac{b}{a}$ (C) ab (D) - ab

(3) $\frac{d}{dx}(e^{x^2+1}) =$ (A) $2\,e^{x^2+1}$ (B) $2xe^{x^2+1}$ (C) e^{x^2+1} (D) xe^{x^2+1}

(4) $\frac{d}{dx}(\tan^{-1} 4x) =$ (A) $\frac{-1}{1+16\,x^2}$ (B) $\frac{4}{1+16\,x^2}$ (C) $\frac{1}{1+16\,x^2}$ (D) $\frac{-4}{1+16\,x^2}$

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

(6) $Y = e^{2x}$, Y_4 = (A) $8e^{2x}$ (B) $16e^{2x}$ (C) e^{8x} (D) e^{16x}

(7) $\int e^{2x}$ (-Sin x + 2 Cos x)dx = (A) e^{2x} Cos x + C (B) e^{2x} Sin x + C (C) - e^{2x} Cos x + C (D) $2e^{2x}$ Cos x + C

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

(9) $\int_0^{\pi/4}$ Sec ^{2} x dx = (A) 5 (B) 4 (C) 2 (D) 1

(10) $\int_0^{1/\sqrt{2}} \frac{dx}{\sqrt{1-x^2}}$ = (A) $\frac{\pi}{6}$ (B) $\frac{\pi}{4}$ (C) $\frac{\pi}{3}$ (D) π

(11) Distance between the points (2,3) and (3,2) is (A) $\sqrt{2}$ (B) 2 (C) 1 (D) $2\sqrt{5}$

(12) Slope –intercept form of straight line is (A) x =0 (B) $\frac{x}{a}+\frac{y}{b}$ = 1 (C) y = mx +c (D) y = 0

(13) The slope of line –ax + by –c = 0 is (A) $\frac{a}{b}$ (B) $\frac{-a}{b}$ (C) $\frac{b}{a}$ (D) $\frac{a}{c}$

(14) The point of intersection of medians of a triangle is (A) centroid (B) orthocenter (C) circumference (D) incenter

(15) Solution of inequality x+2y < 6 is (A) (1,3) (B) (1,1) (C) (1,4) (D) (1,5)

(16) The radius of the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ is

(A) $\sqrt{g^2+f^2+C}$ (B) $\sqrt{g^2-f^2+C}$ (C) $\sqrt{g^2-f^2-C}$ (D) $\sqrt{g^2+f^2-C}$

(17) The length of the diameter of the circle $x^2 + y^2 = a^2$ is (A) 1 (B) 2 (C) 2a (D) a

(18) If a circle and a line intersect in two points, then the line is called (A) chord (B) secant (C) radius (D) diameter

(19) If $\underline{V}$ = $-\underline{i} -2\underline{j} -3\underline{k}$, then $|\underline{V}|$ = (A) $-\sqrt{6}$ (B) −14 (C) $\sqrt{14}$ (D) 6

(20) If $\overrightarrow{OA} = \vec{a}$, $\overrightarrow{OB} = \vec{b}$ then $\overrightarrow{AB}$ is (A) $\vec{a}+\vec{b}$ (B) $\vec{a}\,.\,\vec{b}$ (C) $\vec{a}-\vec{b}$ (D) $\vec{b}-\vec{a}$

DGK-G2-12-18

MATHEMATICS, GROUP SECOND | 12th CLASS - 2018 | TIME : 2.30 HOURS | MARKS : 80

SUBJECTIVE

SECTION-I

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

1	Express the perimeter "P" of square as a function of its area, "A".
2	Evaluate $\lim_{x \to 0} \frac{\sin ax}{\sin bx}$
3	Give the criterion for Existence of limit of a function
4	Give the definition of Derivative of function $f(x)$
5	Find the derivative of $y = (x^2 + 5)(x^3 + 7)$ w.r.t. x
6	If $y = \sqrt{x + \sqrt{x}}$ find $\frac{dy}{dx}$ by making suitable substitution.
7	Differentiate Sin x w.r.t. cot x.
8	Find $f'(x)$ if $f(x) = \ln(e^x + e^{-x})$
9	Find $\frac{dy}{dx}$, if $y = \sinh^{-1}(x^3)$
10	Find y_2 if $y = \sqrt{x} + \frac{1}{\sqrt{x}}$
11	Define increasing and decreasing functions.
12	Find extreme values of $f(x) = 5x^2 - 6x + 2$

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

1	Find the approximate increase in the volume of a cube if the length of its each edge changes from 5 to 5.02
2	Using differential find $\frac{dy}{dx}$ when $x^4 + y^2 = xy^2$
3	Evaluate $\int \frac{(1+e^x)^3}{e^x} dx$
4	Evaluate $\int \frac{ax+b}{ax^2+2bx+c} dx$
5	Evaluate $\int \frac{\cot\sqrt{x}}{\sqrt{x}} dx \quad x > 0$
6	Evaluate $\int \frac{\sin\theta}{1+\cos^2\theta} d\theta$
7	Evaluate $\int x^4 \ln x \, dx$
8	Evaluate $\int_0^{\pi/6} x \cos x \, dx$
9	Evaluate $\int_1^2 \frac{x}{x^2+2} dx$
10	Find the area bounded by "cos" function from $x = -\pi/2$ to $x = \pi/2$
11	Graph the solution set of linear inequality $3x + 7y \geq 21$
12	Define a "corner point"

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

1	The points A (-5, -2), B (5, -4) are end points of the diameter of circle. Find the centre and radius of circle
2	By means of slopes, show that following points lie on the same line.(-4,6);(3,8);(10,10)
3	Find an equation of the vertical line through (-5, 3)
4	Convert into two –intercept form $4x + 7y - 2 = 0$
5	Find point of intersection of the lines $3x + y + 12 = 0$ and $x + 2y - 1 = 0$
6	Find the focus and the vertex of the parabola $x^2 = 5y$
7	Write an equation of parabola with Focus (-3,1); directrix $x = 3$
8	Find an equation of the ellipse with foci (±3,0) and length of minor axis 10.
9	Find center and foci of the ellipse $x^2 + 4y^2 = 16$
10	Find the unit vector in the same direction as the vector $\underline{V} = [-2,4]$
11	Find "α", so that $\lvert \alpha\underline{i} + (\alpha+1)\underline{j} + 2\underline{k} \rvert = 3$
12	Find a vector whose magnitude is 4 and is parallel to $2\underline{i} - 3\underline{j} + 6\underline{k}$
13	Find magnitude of the vector $\underline{V}$ and write the direction cosines of $\underline{V}$ where $\underline{V} = 2\underline{i} + 3\underline{j} + 4\underline{k}$

SECTION-II

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

5-(A)	Find the value of k. If the function $f(x) = \begin{cases} \frac{\sqrt{2x+5}-\sqrt{x+7}}{x-2} & , x \neq 2 \\ K & , x = 2 \end{cases}$ is continuous at $x = 2$
(B)	Expand a^x in the Maclaurin series expansion upto 4-terms.
6-(A)	Evaluate the integral $\int \frac{x \sin^{-1}x}{\sqrt{1-x^2}}\,dx$
(B)	The point A(-1,2) , B(6,3) and C(2,-4) are vertices of a triangle. Show that the line joining the midpoint D of $\overline{AB}$ and the midpoint E of $\overline{AC}$ is parallel to $\overline{BC}$ and $\overline{DE} = \frac{1}{2}\overline{BC}$
7-(A)	Evaluate $\int_0^{\pi/6} x \cos x \, dx$
(B)	Maximize $f(x,y) = 2x + 5y$, Subject to the constraints $2y - x \leq 8$, $x - y \leq 4$, $x \geq 0$, $y \geq 0$
8-(A)	Show that the circles $x^2+y^2+2x-2y-7=0$ and $x^2+y^2-6x+4y+9=0$ touch externally
(B)	Show that the vectors $2\underline{i} - \underline{j} + \underline{k}$, $\underline{i} - 3\underline{j} - 5\underline{k}$ and $3\underline{i} - 4\underline{j} - 4\underline{k}$ form sides of a right triangle.
9-(A)	Find an equation of Hyperbola with given data Foci $(2 \pm 5\sqrt{2}, -7)$,length of transverse axis 10.
(B)	In any triangle ABC , Prove that $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$