DGK-Gl-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) (± a , 0) (B) (0 , ± a) (C) (0 , ± ae) (D) (± 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 $2\propto \hat{i} + \hat{j} - \hat{k}$ and $\hat{i} + \propto \hat{j} + 4\hat{k}$ are perpendicular to each other , then value of " $\propto$ " is
(A) 3 (B) $\frac{1}{3}$ (C) $\frac{2}{3}$ (D) $\frac{4}{3}$

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MATHEMATICS , GROUP FIRST | 12th CLASS - 12018 | TIME : 2.30 HOURS

SUBJECTIVE | MARKS : 80

SECTION-I

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 $e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \ldots\ldots$

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

1	Evaluate $\int \frac{\text{Sin}x + \text{Cos}^3 x}{\text{Cos}^2 x \, \text{Sin}x} dx$
2	Evaluate $\int \frac{1-x^2}{1+x^2} dx$
3	Evaluate $\int \frac{\text{Cot}\sqrt{x}}{\sqrt{x}} dx$
4	Evaluate $\int \frac{1}{(1+x^2)^{3/2}} dx$
5	Evaluate $\int x^4 \ln x \, dx$
6	Evaluate $\int e^x (\text{Cos}\, x + \text{Sin}\, x) dx$
7	Evaluate $\int_1^{\sqrt{5}} \sqrt{(2t-1)^3} dt$
8	Solve the differential equation $\text{Sec}\, x + \tan y \frac{dy}{dx} = 0$
9	Find area between x-axis and the curve $y = \text{Cos}\frac{x}{2}$: $x = -\pi$ 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 $\text{Cos}(\alpha + \beta) = \text{Cos}\,\alpha \,\text{Cos}\,\beta - \text{Sin}\,\alpha \,\text{Sin}\,\beta$
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 $2\underline{i} \times 2\underline{j} \,.\, \underline{k}$

(P.T.O)

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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