PAPER CODE - 8192

MATHEMATICS | **12th CLASS – 12022** | **TIME: 30 MINUTES**

GROUP : SECOND | **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 DGK G2-20

1 $\lim_{n \to +\infty} \left(1+\frac{1}{n}\right)^{\frac{n}{2}}$ = ...

(A) e^n (B) e (C) $e^{1/2}$ (D) $e^{-1/2}$

2 If $f(x) = 2x + 1$, $g(x) = \frac{3}{x-1}$ $x \neq 1$ then $fog(x)$ = ...

(A) $\frac{5+x}{x-1}$ (B) $\frac{3}{2x}$ (C) $4x + 3$ (D) $\frac{3(x-1)}{4-x}$

3 $\frac{d}{dx}$ $\cot h^{-1} x$ = ...

(A) $\frac{1}{1-x^2}$ (B) $\frac{1}{x^2-1}$ (C) $\frac{1}{1+x^2}$ (D) $\frac{-1}{1+x^2}$

4 $\frac{d}{dx}$ $(x+4)^{1/3}$ = ...

(A) $(x+4)^{-1/3}$ (B) $\frac{1}{3}(x+4)^{-1/3}$ (C) $\frac{1}{3}(x+4)^{-2/3}$ (D) $\frac{1}{3}(x+4)^{2/3}$

5 $\frac{d}{dx}$ $e^{\sin x}$ = ...

(A) $e^{\sin x}$ (B) $\cos x\, e^{\sin x}$ (C) $\sin x\, e^{\sin x-1}$ (D) $-\cos x\, e^{\sin x}$

6 If f be a differentiable function on the open interval (a , b) then f is increasing function if .....

(A) $f'(x) < 0$ (B) $f'(x) > 0$ (C) $f'(x) \leq 0$ (D) $f''(x) < 0$

7 $\int \frac{1}{ax+b}\, dx$ = ...

(A) $\ln|ax+b| + c$ (B) $\frac{ax+b}{a} + c$ (C) $\frac{-a}{(ax+b)^2} + c$ (D) $\frac{1}{a}\ln|ax+b| + c$

8 $\int (f(x))^{-1} f'(x)\, dx$ = ...

(A) $\ln|f(x)| + c$ (B) $\frac{[(f(x))^{-1}]^2}{2} + c$ (C) $(f(x))^{-1} + c$ (D) $f(x) + c$

9 $\int \tan^2 x\, dx$ = ...

(A) $\sec^2 x + c$ (B) $\sec^2 x - x + c$ (C) $x - \sec^2 x + c$ (D) $-\operatorname{cosec}^2 x + c$

10 Solution of the differential equation $x\frac{dy}{dx} = 1 + y$ is .....

(A) $c - \frac{1}{x}$ (B) ce^y (C) $y = cx - 1$ (D) $x^2 + y^2 = c$

11 Equation of horizontal line through (7 , - 9) is .....

(A) y = - 9 (B) y = 9 (C) x = 7 (D) x = -7

12 Slope intercept form of the line $2x + y - 11 = 0$ is

(A) $\frac{x}{(11/2)} + \frac{y}{11} = 1$ (B) y = - 2x + 11 (C) y = 2x - 11 (D) y = - 2x - 11

13 If $\theta = 45^\circ$ be the inclination of the line with x-axis then slope of the line is .....

(A) $\frac{-1}{\sqrt{2}}$ (B) $\frac{1}{\sqrt{2}}$ (C) -1 (D) 1

14 The equation $ax^2 + 2hxy + by^2 = 0$ represents a pair of orthogonal lines if

(A) $h^2 - ab = 0$ (B) $a + b = 0$ (C) $h^2 + ab = 0$ (D) $a - b = 0$

15 The non-negative constraints used in a system of linear in equalities are called

(A) Problem constraints (B) Decision variable (C) Feasible solution (D) Optimal solution

16 Co-ordinate of the centre of the circle $x^2 + y^2 + 12x - 10y = 0$ is

(A) (6 , - 5) (B) (- 6 , - 5) (C) (- 6 , 5) (D) (6 , 5)

17 Focus of the parabola $x^2 = - 4ax$ is

(A) (0 , - a) (B) (0 , a) (C) (- a , 0) (D) (a , 0)

18 Equation of Directrices of Hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$

(A) y = 0 (B) x = 0 (C) $y = \pm\frac{c}{e^2}$ (D) $x = \pm\frac{c}{e^2}$

19 The value of $[\underline{i}\ \ \underline{i}\ \ \underline{k}]$ = ...

(A) 1 (B) 0 (C) -1 (D) $\underline{k}$

20 With usual notations in any triangle ABC $c\cos A + a\cos c$ = ...

(A) a (B) b (C) c (D) 1

MATHEMATICS
GROUP : SECOND

12th CLASS - 12022
SUBJECTIVE
SECTION-I

D

TIME : 2.30 HOURS
MARKS : 80

QUESTION NO. 2 Write short answers any Eight (8) of the following DGK-92-22 **16**

i	If $f(x) = x^2 - x$, Evaluate $f(x-1)$
ii	Explain Identity function by example
iii	Evaluate $\lim_{x \to \pi} \frac{\sin x}{\pi - x}$
iv	Show that $x = a \cos t$ and $y = a \sin t$ are the parametric equation of the circle $x^2 + y^2 = a^2$
v	Express $\lim_{n \to +\infty} \left(1 + \frac{3}{n}\right)^{2n}$ in terms of e
vi	If $x = t^2 + 1$, $y = t^2$ find $\frac{dy}{dx}$
vii	If $3x + 4y + 7 = 0$ then find $\frac{dy}{dx}$
viii	Differentiate $\frac{1}{a} \sin^{-1} \frac{a}{x}$ w.r.t x
ix	Find y_2 if $x^2 + y^2 = a^2$
x	Explain increasing function and give its example
xi	Differentiate sin x w.r.t cot x
xii	Calculate $\frac{d}{dx}(3x^{4/3})$

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

i	Evaluate $\int \frac{\cos 2x - 1}{1 + \cos 2x} dx$
ii	Evaluate $\int a^{x^2} x \, dx$
iii	Evaluate $\int \frac{dx}{\frac{1}{2}\sin x + \frac{\sqrt{3}}{2}\cos x}$
iv	Evaluate $\int (\text{en } x)^2 dx$
v	Find $\int_{-1}^{3} (x^3 + 3x^2) dx$
vi	If $\int_{-2}^{1} f(x) dx = 5$ and $\int_{-2}^{1} g(x) dx = 4$ Then evaluate $\int_{-2}^{1} (2f(x) + 3g(x)) dx$
vii	Find area between the x-axis and the curve $y = 4x - x^2$
viii	Check $y = \tan(e^x + c)$ is a solution of the differential equation of $\frac{dy}{dx} = \frac{y^2+1}{e^{-x}}$
ix	If the vertices of a triangular region are A(5 , 3) , B(-2 , 2) and C(4 , 2) . Find its area
x	Convert $5x - 12y + 39 = 0$ into slope intercept and intercept form
xi	Find the point three-fifth of the way along line segment from A(-5 , 8) to B(5 , 3)
xii	By means of slope show that the points (4 , -5) , (5 , 7) and (10 , 15) lies on a same line

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

i	Graph the solution set of linear inequality $3y - 4 \leq 0$ in xy – plane
ii	Define feasible region and feasible solution
iii	Find an equation of the circle with centre at $(\sqrt{2} , -3\sqrt{3})$ and radius $2\sqrt{2}$
iv	Find the focus and directrix of the parabola $y^2 = -8(x - 3)$
v	Find an equation of the ellipse with foci $(-3\sqrt{3} , 0)$ and vertices $(\pm 6 , 0)$
vi	Find focus of the parabola $x^2 - 4x - 8y + 4 = 0$
vii	Check the position of the point (5 , 6) with respect to the circle $x^2 + y^2 = 81$
viii	Find the centre and radius of the circle $4x^2 + 4y^2 - 8x + 12y - 25 = 0$
ix	Write the vector $\underline{PQ}$ in the form $x\underline{i} + y\underline{j}$ if P(0 , 5) , Q(-1 , -6)
x	Find the sum of the vectors $\underline{AB}$ and $\underline{CD}$ given that four points A(1 , -1) , B(2 , 0) , C(-1 , 3) , D(-2 , 2)
xi	Find a unit vector in the direction of $\underline{V} = \underline{i} + 2\underline{j} - \underline{k}$
xii	Find the cosines of angle θ between $\underline{U} = [2 , -3 , 1]$, $\underline{V} = [2 , 4 , 1]$
xiii	Prove that $\underline{a} \times (\underline{b} + \underline{c}) + \underline{b} \times (\underline{c} + \underline{a}) + \underline{c} \times (\underline{a} + \underline{b}) = 0$

(P.T.O)

SECTION-II

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

DGK-92-22

Q.5- (A)	Find $\lim_{\theta \to 0} \frac{\tan\theta - \sin\theta}{\sin^3\theta}$
(B)	Prove that if $\frac{y}{x} = \tan^{-1}\frac{x}{y}$ then $\frac{dy}{dx} = \frac{y}{x}$
Q.6- (A)	Evaluate $\int \frac{x + \sin x}{1 + \cos x}\, dx$
(B)	Find an equation of line through (- 4 , 7) and parallel to the line $2x - 7y + 4 = 0$
Q.7-(A)	Evaluate $\int_0^{\pi/4} \frac{\sec\theta}{\sin\theta + \cos\theta}\, d\theta$
(B)	Graph the feasible region of the system of linear inequalities and find the corner points of $3x + 2y \geq 6$, $x + y \leq 4$, $x \geq 0$, $y \geq 0$
Q.8-(A)	Find a joint equation of the straight lines through the origin perpendicular to the lines represented by $x^2 + xy - 6y^2 = 0$
(B)	Find equation of the tangent drawn from (0 , 5) to $x^2 + y^2 = 16$
Q.9-(A)	Find the centre , foci , eccentricity , vertices and equations of directrices of $\frac{y^2}{4} - x^2 = 1$
(B)	Prove that : $\sin(\propto + \beta) = \sin \propto \cos\beta + \cos \propto \sin\beta$