(12th CLASS 12015)

MATHEMATICS
GROUP SECOND

TIME : 2.30 HOURS
MARKS : 80

SUBJECTIVE
SECTION-I

QUESTION NO. 2 Attempt any eight (8) short questions 16

(1) $f(x) = x^3 - ax^2 + bx + 1$ If $f(+2) = -3$ and $f(-1) = 0$ Find values of a and b

(2) $\lim_{x \to 0} \frac{\sin ax}{\sin bx}$

(3) $\lim_{x \to 2} \frac{x^3 - 8}{x^2 - x - 6}$

(4) Differentiate $\frac{1}{(ax+b)^n}$ w.r.t x

(5) If $y = x^4 + 2x^2 + 2$ prove that $dy/dx = 4x\sqrt{y-1}$

(6) Find dy/dx if $x = \theta + 1/\theta$, $y = \theta + 1$

(7) Differentiate $\sin^3 x$ w.r.t $\cos^2 x$

(8) Prove that $d/dx\,[\tan^{-1} x] = \frac{1}{1+x^2}$

(9) Find dy/dx if $x = y \sin y$

(10) Find dy/dx if $y = (\log x)^{\log x}$

(11) Find y_2 if $x = at^2$, $y = bt^4$

(12) If $y = (\cos^{-1} x)^2$ Prove that $(1-x^2)\,y_2 - xy_1 - 2 = 0$

QUESTION NO. 3 Attempt any eight (8) short questions 16

(1) Use differential to approximate the value of $(31)^{1/5}$

(2) Evaluate $\int \sqrt{2x+3}\ dx$

(3) Evaluate $\int \tan^2 x\ dx$

(4) Evaluate $\int \sec x\ dx$

(5) Evaluate $\int a^{x^2} x\ dx$

(6) Find $\int \sqrt{a^2 + x^2}\ dx$

(7) Evaluate $\int e^{-x}(\cos x - \sin x)\ dx$

(8) Evaluate $\int \frac{1}{x^2 - 1}\ dx$

(9) Evaluate $\int_0^3 \frac{dx}{x^2 + 9}$

(10) Solve the differential equation $\frac{dy}{dx} = \frac{1-x}{y}$

(11) Indicate the solution set of the inequality $3x + 7y \geq 21$

(12) Graph the solution region of the linear inequalities $x + y \leq 5$; $-2x + y \leq 2$; $y \geq 0$

QUESTION NO. 4 Attempt any Nine (9) short questions 18

(1) Find the mid point of the line joining the two points A(3,1) , B(- 2 , - 4)

(2) The points A(-5 , -2) and B(5 , - 4) are ends of a diameter of a circle Find centre and radius of the circle

(3) Find the point trisecting the join of A(-1 , 4) and B(6 , 2)

(4) Let $P(x_1 , y_1)$ and $Q(x_2 , y_2)$ are two points on a line. Find the slope of line PQ

(5) Write the point – slope form of equation of straight line

(6) Write the standard form of equation of circle

SECTION-II

Note: Attempt any three questions from this section $3 \times 10 = 30$

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 k so that f(x) is continuous at x = 2

(b) Differentiate $\frac{x^2+1}{x^2-1}$ w. r. t. x^3

6.(a) Evaluate $\int \left(\frac{1-Sinx}{1-Cosx}\right) e^x \, dx$

(b) One vertex of a parallelogram is (1, 4), the diagonals intersect at (2, 1) and the sides has slope 1 and $-\frac{1}{7}$. Find other three vertices

7.(a) Solve the differential equation $y - x \frac{dy}{dx} = 2\left(y^2 + \frac{dy}{dx}\right)$

(b) Maximize the function defined by $f(x, y) = 2x + 3y$
subject to the constraints
$2x+y \leq 8$, $x+2y \leq 14$, $x \geq 0, y \geq 0$

8.(a) Find an equation of the circle passing through the points A(1, 2) and B(1, -2) and touching the line $x + 2y + 5 = 0$

(b) By vector method , prove that $Cos(\alpha + \beta) = Cos\alpha \; Cos\beta - Sin\alpha \; Sin\beta$

9.(a) A parabolic arch has a 100 m base and height 25 m. Find the height of the arch at the point 30 m from the centre of the base

(b) If $\underline{a} + \underline{b} + \underline{c} = 0$ then prove that $\underline{a} \times \underline{b} = \underline{b} \times \underline{c} = \underline{c} \times \underline{a}$

ROLL NO..... **PAPER CODE = 8191**

(12th CLASS - 12015)

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) The range of $f(x) = x^2$ is

(A) $(-\infty, \infty)$ (B) $(-\infty, 0)$ (C) $(0, \infty)$ (D) $(-1, 0)$

(2) $\lim_{x \to 0} \frac{\sin x}{x} =$

(A) 1 (B) $\frac{\pi}{180}$ (C) - 1 (D) $\frac{180}{\pi}$

(3) if $y = \sqrt{x}$ then $\frac{dy}{dx} =$

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

(4) If $f(x) = \sin x$ then $f'(0) =$

(A) Cos x (B) 1 (C) 0 (D) - 1

(5) $\frac{d}{dx}(\tan^{-1} x) =$

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

(6) If $y = e^{ax}$ then $y_4 =$

(A) $a^4 e^{ax}$ (B) $2\frac{e^{ax}}{a}$ (C)) $3e^{ax}$ (D)) xe^{ax}

(7) $\frac{d}{dx} a^x =$

(A) a^x (B) xa^{x-1} (C) $a^x \ln a$ (D) x In a

(8) $\int e^{ax} dx =$

(A) e^{ax} (B) ae^{ax} (C) xe^{ax} (D) $\frac{e^{ax}}{a}$

(9) $\int_{-\pi}^{\pi} \cos x \, dx =$

(A) 0 (B) 2 (C) - 2 (D) 1

(10) $\int \sec^2 x \tan x \, dx =$

(A) $\sec x \tan^2 x$ (B) $\frac{\sec^3 x}{3}$ (C) $\frac{\tan^2 x}{2}$ (D) $\frac{\sec^3 x \tan x}{3}$

(11) $\int_0^1 \frac{1}{1+x^2} dx =$

(A) $\frac{\pi}{2}$ (B) $\frac{\pi}{4}$ (C) 1 (D) 0

(12) $\int \frac{1}{x \ln x} dx =$

(A) In (In x) (B) x (C) $\frac{\ln x}{x}$ (D) $\frac{1}{x}$

(13) Solution of differential equation $\frac{dy}{dx} = -y$ is

(A) $y = Ce^{-x}$ (B) Ce^{x} (C) e^{cx} (D) xe^{-x}

(14) Distance between the points (2, 3) and (3, 2) is

ROLL NO..... **PAPER CODE = 8192**

(12th CLASS - 12015)

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 range of the function $f(x) = \frac{1x+21}{x+2}$ $x \neq -2$ is

(A) {1} (B) {-1 , 1} (C) {- 1} (D) R – {-1 , 1}

(2) $f(x) = x^3 + \text{Sin}x$ then f(x) is

(A) constant function (B) Even function (C) Odd function (D) Neither even nor odd

(3) If $f(x) = -\text{Sin}\,x$ then $f'''(\text{Cos}^{-1}x) =$ (A) Cos x (B) – x (C) – Sinx (D) x

(4) Instantaneous rate of change of y with respect to x is given by

(A) Sy/Sx (B) Sx/Sy (C) dy/dx (D) dx/dy

(5) $f(x) = \frac{1}{x-2}$ then $f(2) =$ (A) 1 (B) 0 (C) -1 (D) ∞

(6) $f(x) = \text{Cot}x$ then $f'(\pi/6) =$ (A) - 4 (B) 4 (C) ¼ (D) – ¼

(7) $f(x) = \text{Sec}^{-1}x$ then $f'(\text{Sec}x) =$ (A) $\frac{1}{x\sqrt{x^2-1}}$ (B) Secx tanx (C) Cos^2x Cosecx (D) $-\text{Cos}^2x$ Cosecx

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

(9) $\int o\,dx =$ (A) 1 (B) 0 (C) Constant (D) x

(10) $y = C e^{x^2}$ is solution of

(A) $1/x \frac{dy}{dx} - 2y = 0$ (B) $x \frac{dy}{dx} - 2y = 0$ (C) $\frac{dy}{dx} - 2y = 0$ (D) $1/x \frac{dy}{dx} - y = 0$

(11) $\int_{-\pi}^{\pi} \text{Sin}x\,dx =$

(A) 0 (B) 2 (C) - 2 (D) 1

(12) $\text{Siny Cosecy} \frac{dy}{dx} = 1$

(A) Cosy = Cosx + c (B) y = x + c (C) Cosy = Cosy + c (D) – Cosy = - Cosy + c

(13) $\int \text{Cosx}\, e^{\text{sinx}}\,dx =$ (A) $e^{\text{Cosx}} + c$ (B) $\text{Sinx}\, e^{\text{Cosx}} + c$ (C) $e^{\text{sinx}} + c$ (D) $e^{\text{sinx}}\,\text{Cosx} + c$

(14) The x – intercept of the line $2x + 3y - 1 = 0$ is (A) ½ (B) 2 (C) 3 (D) 1/3

(15) What is the nature of line $ax + by + c = 0$ when $a = 0$ and $b \neq 0$, $c \neq 0$

(A) Line is parallel to y-axis (B) Line is parallel to x-axis (C) Line passes through origin

(D) Line is perpendicular to x-axis

(16) $x = 0$ is not in the solution of inequality

(A) $2x + 3 > 0$ (B) $x + 4 > 0$ (C) $x + 5 > 0$ (D) $2x + 3 < 0$

(17) Focal distance of point P(x , y) on $x^2 = 4ay$ is

(A) x + a (B) y + a (C) x – a (D) y – a

(18) The equation of tangent to the circle $x^2 + y^2 + 2gx + 2fy = 0$ at the origin is

(A) x = 0 (B) y = 0 (C) fx + gy = 0 (D) gx + fy = 0