Topic: Function

a) $f(x) = 64^x + \log x \ find \ f\left(\frac{1}{3}\right)$

b) $f(x) = 16^x - \log_4 x \ find \ f\left(\frac{1}{4}\right)$

c) $f(x) = \frac{x^2+1}{x^3-1} \ find \ f(-1) \ \& \ f\left(\frac{1}{2}\right)$

d) $f(x) = x^2 + 2x - 5 \ find \ f(-2) \ \& \ f(3)$

e) $f(x) = 3 + \log_4 x \ find \ f\left(\frac{1}{4}\right)$

Q1. Find Function is Even or odd	Q2. Find value of function
a) $f(x) = x^3 - 5x + \sin x + x \cos x$ b) $f(x) = \frac{e^x+e^{-x}}{5}$ c) $f(x) = \frac{a^x+a^{-x}}{6}$ d) $f(x) = 3x^4 + x^2 + 5 - 3\cos x + 2(\sin x)^2$ e) $f(x) = x^3 + 4x + \sin x$ f) Define Even and odd function with suitable example g) Define implicit function	a) $f(x) = 16^x - \log_2 x$, find f(1/2) b) $f(x) = \log_4 x + 8$, find f(1/4) c) $f(x) = \log_3 x + 64^x$, find f(1/3) d) $f(x) = x^2 + 6x + 10$ find f(2) + f(-2) e) $f(x) = x^3 - x$ find f(1) + f(2) f) $f(x) = x^2 + 5x + 1$ find f(0) + f(1) g) $f(x) = x^2 - x + 1$ find f(0) + f(3) h) $f(x) = x^2 + 6x + 10$ find f(2) + f(-2) i) $f(x) = \frac{x^2+9}{\sqrt{x-3}}$, find f(4) + f(5) j) $f(x) = \frac{x^2+1}{x^3-1}$ find f(1/4)
Q3. Show that a) $f(x) = x^3 - 5x^2 - 4x + 20$, Show that $f(0) = -2 \ f(3)$ b) $f(x) = 3x^2 - 5x + 7$ show that $f(-1) = 3 \ f(1)$	Q4. Find missing element value a) $f(x) = px^2 + 11$ and $f(-1) = 15$ find p b) $f(x) = ax^2 - bx - 1$, $f(2) = 5$, $f(-2)=10$ find a and b

Topic: Derivative

Q1. Find dy/dx of following

a) $y = e^x + a^x + x^a + a^a$

b) $y = \sin^2(4x)$

c) $y = \tan^4(x^3)$

d) $y = \cot[\tan(x^2)]$

e) $y = \cos(5x^2)$

f) $y = \sec(4x + logx)$

g) $y = \log(\tan x)$

h) $y = cosec(x^a + a^a)$

i) $y = e^{4x} + a^{5x}$

j) $y = a^{3x} + a^{5a}$

Q2. Find dy/dx of following

a) $y = e^x \cdot x^3$

b) $y = e^{5x} \cdot x^7$

c) $y = \cos^5(3x)$

d) $y = x^3 \cdot \tan(4x)$

e) $y = e^{4x} \cdot \cot(6x)$

f) $y = 5^{3x} \cdot \log(7x)$

g) $y = \sec(4x) \cdot cosec(5x)$

h) $y = \dfrac{\sec x}{\cos x}$

i) $y = \dfrac{\sin 6x}{\cos 5x}$

j) $y = \dfrac{x^3}{\log 5x}$

k) $y = \dfrac{e^{5x}}{\log x^3}$

l) $y = \dfrac{\tan 5x}{\cos}$

Q3. Find dy/dx of following

a) $x = a(\theta - sin\theta), \quad y = a(1 - cos\theta)$

b) $x = a(cost + tsint), \quad y = a(sint - tcost)$

c) $x = a(cos^3\theta), \quad y = a(sin^3\theta)$

d) $y = 3sin\theta - 2(sin^3\theta), \quad x = 3cos\theta - 2(cos^3\theta)$

Q5. Find dy/dx of following

a) $x^p \cdot y^q = (x + y)^{p+q}$

b) $y = x^x + x^{\sqrt{x}}$

c) $x^y = e^{x-y}$

Q6. Find dy/dx of following

a) $y = x^2 * e^{3x}$
b) $y = \sin x * \cos(2x)$
c) $y = e^{2x}.\log(x + 1)$
d) $y = e^x.\sin^{-1} x$
e) $y = (x^2 + 1)^5$
f) $y = e^{x.\log_e 5}$
g) $y = e^{3x}.\cos^{-1} 5x$
h) $y = \log(x^2 + 2x + 5)$
i) $y = \log_{20} x + 30^x$
j) $y = (x^4 + 2x)^3.\sin(3x)$
k) $x^2 + xy = y^3$
l) $y = (sin^{-1}x)^x + (\cos x)^{\sin x}$
m) $4x^6 + 5x^2y^3 - 6y^4 = 0$
n) Find $\frac{dy}{dx}$ if x² + y² + xy-y at (1,2)
o) Find $\frac{dy}{dx}$ if 13x² + 2yx² + y³ = 1

Topic: Application of Derivative

Q1. Find Tangent & normal equation for

a) $2x^2 - xy + 3y^2 = 16$ at (3,1)

b) $y = x^3 + 3x^2 - 9x + 7$ at (1, 2)

c) $4x^2 + 9y^2 = 40$ at (1, 2)

d) Find Equation of tangent & normal to curve $4x^2 + 9y^2 = 40$ at (3,2)

e) Find equation of tangent and normal to curve $x = \frac{1}{t}, y = 1 - \frac{1}{t}, if\ t = 2$

f) Slope of curve $2y^3 = ax^2 + b$ at (1,-1) is same as slope of x + y = 0
Find a & b.

g) Find equations of tangent & normal to curve $2x^2 - xy + 3y^2 = 18\ at$ (3,1)

h) Find two equation of tangent to curve $x^2 + y^2 + 6x - 6y - 7 = 0$ where it cuts
X – axis.

Q2. Find Radius of curvature for

a) To Curve $y = x^5$ at (3,-3)

b) To Curve $y = 2\sin x - \sin 2x$ at $x = \frac{\pi}{2}$

c) To Curve $y = e^x$ at (0,1)

d) To Curve $y = x\ (x - 2)$ at (2,0)

e) To Curve $xy = c$ at point (c,c)

f) To Curve $y = x^3$ at (2,8)

g) To Curve $x^4 + y^4 = 2$ at (1,1)

h) To curve $\sqrt{x} + \sqrt{y} = 1$ at (¼, ¼)

i) To curve $y^2 = 4ax$ at (a,2a)

Q3. Find maxima and minima for

a) y = 2x³ – 3x² – 36x + 10

b) y = x³ + 3x² – 2

c) y = x³ – 9x² + 24x

d) y = x³ – 18x² + 96x

Q4. Solve

a) Find dimension of rectangle of largest area having fixed perimeter 80cm.

b) A metal wire 100cm long is bent to form a rectangle. Find side when area is max.

c) Divide 120 in two parts such way that their product is maximum.

d) Divide 20 in two parts such that product of one and cube of other is maximum.

e) A manufacturer can sell x items at price Rs. (330 – X) each. The cost of producing x items is Rs. (X² + 10X + 12) Determine number of items to be sold so that manufacturer can make maximum profit.

f) A manufacturer can sell 'x' items per week at price (23-0.001x) rupees each. It cost (5x+2000) rupees to produce x items. Find number of items to be produced per week for maximum profit.

Topic: Integration

For 2 Marks

a) $I = \int logx . dx$	b) $I = \int x . e^x dx$	c) $I = \int \frac{1}{3x+5} dx$
d) $I = \int \cos 2x \, dx$	e) $I = \int (\cos x)^2 dx$	f) $I = \int (tanx + cotx)^2 dx$
g) $I = \int (\sin x)^2 dx$	h) $I = \int \sin 2x \, dx$	i) $I = \int (e^{3x} + a^{2x} + x^{4a} + a^{5a}) dx$

Q2. Solve

   a) $I = \int \frac{1}{2x+5} dx$

   b) $I = \int \frac{x}{x^2+6} dx$

   c) $I = \int 2\sqrt{x} dx$

   d) $I = \int (\sqrt{x} - x^2) dx$

   e) $\int \frac{1}{2x^2+3x+1} dx$

   f) $\int \frac{1}{(x+4)(x+9)} dx$

   g) $\int \frac{1}{(2-x)(2x-1)} dx$

Q2. Solve

   a) $I = \int x . (\sin^{-1} x) dx$

   a) $I = \int x^3 . (\tan^{-1} 4x) dx$

   b) $I = \int e^x . \sin 4x \, dx$

Q3. Solve

   a) $I = \int \frac{x-3}{x^3-3x^2-16x+48} dx$

   b) $I = \int \frac{1}{2x^2+3x+1} dx$

Q4. Solve

   a) $I = \int \frac{e^x}{(e^x-1)(e^x+1)} dx$

   b) $I = \int \frac{1}{x(2-\log\ )(2\ logx-1)} dx$

Topic: Numerical Method

Q1. Solve Using Gauss Elimination Method
   a) $x + y + z = 6$, $3x - y + 3z = 10$, $5x + 5y - 4z = 3$
   b) $x + y + z = 4$, $2x + y + z = 5$, $3x + 2y + z = 7$
   c) $x + y + z = 9$, $x - 2y + 3z = 8$, $x - y + 2z = 7$

Q2. Solve Using Newton Raphson Method 4 Iterations
   a) Find Cube root of 400
   b) $x^4 - x - 10 = 0$
   c) $x^3 - 2x - 5 = 0$

Q3. Solve Using Jacobi Method 3 Iterations
   a) $5x - y = 9$, $x - 5y + z = -4$, $y - 5z = 6$
   b) $x + y + 2z = 13$, $x + y - z = 1$, $x + 3y - z = 7$
   c) $10x - 2y - 2z = 6$, $-x - y + 10z = 8$, $-x + 10y - 2z = 7$

Q4. Solve Using Gauss – Seidel Method 3 Iterations

   a) $5x - y = 9$, $x - 5y + z = -4$, $y - 5z = 6$
   b) $x + y + 2z = 13$, $x + y - z = 1$, $x + 3y - z = 7$
   c) $10x - 2y - 2z = 6$, $-x - y + 10z = 8$, $-x + 10y - 2z = 7$