Topic1:COMPLEX NUMBER

1) Z_1 = 4+3i and Z_2 = 2-3i Then find i) $Z_1 + Z_2$ ii) $Z_1 - Z_2$ iii) $Z_1 . Z_2$ iv) $\frac{Z_1}{Z_2}$. v) $\frac{1}{z_1}+\frac{1}{z_2}$

2) Express the following complex number in x+iy form-

a) $\frac{2-\sqrt{3}i}{1+i}$ b) $\frac{2+i}{2-i}$ c) $\frac{2+i}{(2+i)(3+i)}$ d) $\frac{1}{3+5i}+\frac{1}{4-2i}$.

3) If Z = $\frac{1-i}{1+i}$ then show that z is purely imaginary.

4) If Z_1 = 1+2i and Z_2 = 2-3i then express $\frac{Z_2}{Z_1}$ in a + ib form.

5) Find modulus and amplitude of i) $\frac{Z_1}{Z_2}$ IF $Z_1 = 2+2\sqrt{3}i$ and $Z_2 = -1+\sqrt{3}i$.

ii) Z = $1-\sqrt{3}i$ iii) $\frac{(1+i)^2}{1-i}$

6) Express the following complex number in polar form

I) $\frac{-1}{2}+\frac{\sqrt{3}}{2}i$ ii) $1-\cos\alpha + i\sin\alpha$ iii) $-\sqrt{3}+i$ IV) $-2-2\sqrt{3}i$ v) $\frac{1}{2}+\frac{\sqrt{3}}{2}i$

VI) $2\sqrt{2}(1+i)$ vii) $3\sqrt{2}(-1+i)$

7) Using De-moivre's theorem simplify

i) $\frac{(\cos 5\theta - i\sin 5\theta)^2(\cos 7\theta + i\sin 7\theta)^{-3}}{(\cos 4\theta - i\sin 4\theta)^9(\cos\theta + i\sin\theta)^5}$ ii) $\frac{(\cos 3\theta + i\sin 3\theta)^4(\cos 5\theta - i\sin 5\theta)^{\frac{4}{5}}}{(\cos\frac{9}{2}\theta + i\sin\frac{9}{2}\theta)^{\frac{2}{3}}(\cos\frac{4}{5}\theta + i\sin\frac{4}{5}\theta)^{10}}$

8) Show that $(1+i)^8+(1-i)^8$ = 32.

9) Using Euler's formula prove that:

i) $\sin^2\theta+\cos^2\theta=1$ ii) $\sin 2\theta = 2\sin\theta . \cos\theta$ iii) $\cosh^2\theta-\sinh^2\theta=1$. iv) $1+\tan^2\theta=\sec^2\theta$

10) If $\sin(A+iB)$= x + iy then prove that

i) $\frac{X^2}{\cosh^2 B}+\frac{Y^2}{\sinh^2 B}=1$ ii) $\frac{X^2}{\sin^2 A}-\frac{Y^2}{\cos^2 A}=1$

11) If $\cos(A+iB)$= x + iy then prove that

i) $\frac{X^2}{\cosh^2 B}+\frac{Y^2}{\sinh^2 B}=1$ ii) $\frac{X^2}{\cos^2 A}-\frac{Y^2}{\sin^2 A}=1$.

12)Separate into real and imaginary parts i) $\sin(x+iy)$ $ii)\ \cosh(x+iy)$ iii) $\sinh(x-iy)$

13) Separate into real and imaginary parts $\frac{(1+i^3)^2}{(3-i)^3}$.

14)Find cube root of unity.

15) $if\ (3+i)x+(1-i)y=1+7i\ , find\ x\ and\ y.$

16) Find real and imaginary part of $z+z^{-1}$.

17) Using Eulers formula prove that $\cos A-\cos B=-2\sin(\frac{A+B}{2})\sin(\frac{A-B}{2})$.

18)$IF\ 3+4bi=5a+6i\ find\ a\ and\ b.$

19) Using De-moivres thm. prove that $(1+i)^8+(1-i)^8$ = 32.

20) Using De-moivre's theorem simplify $\frac{(\cos\theta-i\sin\theta)^6(\cos 5\theta-i\sin 5\theta)^{-2}}{(\cos 8\theta+i\sin 8\theta)^{\frac{1}{2}}}$.

TOPIC2:Function

1) Define even and odd function
2) If f(x) = $x^3-5x^2-4x+20$ then show that f(0)=-2f(3)
3) If f(x)=x^4-2x+7find f(0)+f(2)
4) If f(x) = x^2+3 then find the value of x for which f(x)=f(2x+1)
5) Show that $3x^4+x^2+5-3cosx+2sin^2x$ is even function.
6) If f(x) = sinx g(x) =cosx show that f(x+y)= f(x)g(y)+g(x)f(y)
7) If f(x) = cosx show that f(3x) = $4f^3(x)-3f(x)$
8) If f(x) = tanx show that f(2x) = $\frac{2f(x)}{1-(f(x))^2}$
9) If f(x)=50sin($100\pi t+0.4$) show that f($\frac{1}{50}+t$)=f(x)
10) If f(x)=log ($\frac{x}{x-1}$) then prove that f(a+1)+f(a)=log($\frac{a+1}{a-1}$)
11) If f(x) = $\frac{x+5}{3x-4}$ and t = $\frac{5+4x}{3x-1}$ then show that f(t)=x
12) If y= f(x)= $\frac{x+1}{x-1}$ then show that x = f(y)
13) If f(x) = log($\frac{1+x}{1-x}$) then prove that f($\frac{2x}{1+x^2}$) = 2f(x)
14) If f(x) = $\frac{2x+5}{3x-4}$ and g(x) = $\frac{5+4x}{3x-2}$ then show that f0g(x) = x
15) If y= f(x)= $\frac{2x-3}{3x-2}$ then show that x = f(y)
16) If f(x) = $\frac{x+3}{4x-5}$ and t = $\frac{3+5x}{4x-1}$ then show that f(t)=x

17) $if\ f(x) = \log x\,, \emptyset(x) = x^3\ show\ that\ f[\emptyset(x)] = 3f(x)$.

18) $if\ f(x) = 3x^4 + x^2 + 5 - 3\cos x + 3\sin^2 x\ \ , show\ that\ f(x) + f(-x)$ =2f(x) .

19) $if\ f(x) = x^2 + 4\,, solve\ f(x+1) - f(x-1) - 12 = 0.$

20) $if\ f(x) = x - \frac{1}{x}\ then\ prove\ that\ [f(x)]^3 = f(x^3) + 3f(\frac{1}{x}).$

21) $if\ f(x) = \log(\frac{1+x}{1-x})\ then\ show\ that\ f(a) + f(b) = f\left(\frac{a+b}{1+ab}\right)$.

22) $if\ f(x) = 16^x + log_4 x\ then\ find\ f\left(\frac{1}{2}\right)\ and\ f\left(\frac{1}{4}\right)$.

23) $if\ f(x) = \frac{x^2+9}{\sqrt{x-3}}\ \ f(4) + f(5).$

24) $if\ f(x) = \log\left(x + \sqrt{1+x^2}\right), show\ that\ the\ function\ is\ odd.$

TOPIC3: NUMERICAL METHOD'S

1) Using Bisection method find the approximate root of following equation's-
   a)$x^2 - 2x - 5 = 0$ upto three iterations.
   b)$x^2 - \log_e x$ = 1.8 upto three iterations.
   c) $x^3 - 5x - 3 = 0$ root lies between 2 & 3.upto three iterations.
   d)$x^3 - 9x - 5 = 0$ in the interval(3,4).
   e)$\sqrt{40}$. carry out three iterations.
   f) Find first two roots of equation $x^3 - 2x - 5 = 0.$

2) Using Regula Falsi / False position method find the approximate root of following equations-

   a) $x^2 - 2x - 9 = 0$ up to three iterations.

   b) $x^3 + 2x - 50 = 0$

   c) $xe^x - 8 = 0$

   d)$x^3 + 3x - 20 = 0$ between 2 & 3 upto three iterations.

   e) $x - \log x = 6$

   f) $x^3 - 9x + 1 = 0$.

3) By using Newton Raphson method find the root of following equations upto three iteration—

   a) $x^4 - x - 5 = 0$

   b) $x^3 - x - 1 = 0$ by taking initial root 1 .

   c) $\sqrt[3]{100}$

d) $x^3 - 20 = 0$

e)$\sqrt{10}$

f) $x^3 - 4x + 1 = 0$ in (1,2) .

4) Using Gauss elimination method solve the following equations—

a) $2x + 5y - 3z = 22, x - 2y + 4z = 3,6x - 7y + z = 10.$

b) $x + y - z = 3, x - y \mp 4z = 4,2x + y + z = 7.$

c)$3x + 4y + z = -3 , x + 2y + z = -1,2x - y + z = 6$.

d) $3x - 4y - 6z = 4,3x + 12y + 9z = -2 , 9x + 8y + 3z = 3.$

5) Solve the following equations using Jacobi's method

a) $10x + y + 2z = 9 , -2x + 10y + 3z = 5,3x - y + 10z = -8$.

b) $20x - 3y + z = 17.5 ,4x + 15y - 5z = 16.5, x - 7y + 10z = 10.5$.

c) $9x - 5y + z = 30 ,3x + 10y + 2z + 7 = 0 ,6x + 5y + 12z - 18 = 0$.

d)$30x + 10y - 3z = 96 ,4x + 25y + 2z = 53 ,2x + 5y + 20z = -6$.

e) $12x + 4y + 3z = 19,5x + 12y + 2z = 19,7x + y + 12z = 20$.

6)Solve using Gauss Seidal method following equations----

a) $10x + 3y + 2z = 2, 5x + 10y + z = 18, 7x + 2y + 10z = 27$.

b) $-15x + 9y + 4z = 2 , 6x - 14y + 3z = 5 ,2x + 5y - 13z = 6$.

c) $x + 7y - 3z = -22 , 5x - 2y + 3z = 18 ,2x - y + 6z = 22$

d) $5x - y = 9 , x - 5y + z = -4, y - 5z = 6$ using initial approximations $x_0 = 1.5$,

$y_0 = 0.5, z_0 = -0.5.$

e)$8x + y + z = 10 ,3x - 8y + 5z = 0, 7x + 8z = 15$, taking initial approximations as $x_0 = y_0 = z_0 = 0.75$.

TOPIC4: LIMIT'S

a)Evaluate: $\lim_{x \to 5} \frac{x^2 - 9x + 20}{x^2 - 6x + 5}$

b)Evaluate:$\lim_{x\to1}\frac{x-1}{2x^2-7x+5}$

c) Evaluate : $\lim_{x\to-5}\frac{2x^2+9x-5}{x+5}$

d)Evaluate: $\lim_{x\to5}\frac{x^3-125}{x^2-7x+10}$

e)Evaluate: $\lim_{x\to5}\frac{x^3-8}{x^2-4}$

f)Evaluate: $\lim_{x\to2}\frac{x^3-6x^2+11x-6}{x^2-6x+8}$

g)Evaluate: $\lim_{x\to1}\frac{x^4-3x^2+2}{x^3-5x^2+3x+1}$.

h)Evaluate: $\lim_{x\to2}\left(\frac{x}{x-2}-\frac{4}{x^2-2x}\right)$

i)Evaluate: $\lim_{x\to3}\left(\frac{1}{x-3}-\frac{2}{x^2-4x+3}\right)$

j)Evaluate: $\lim_{x\to3}\left(\frac{1}{x-3}-\frac{9x}{x^3-27}\right)$

k)Evaluate: $\lim_{x\to2}\left(\frac{1}{x-3}-\frac{3}{x^2-3x}\right)$

l)Evaluate: $\lim_{x\to2}\left(\frac{1}{x-2}-\frac{4}{x^3-2x^2}\right)$

m)Evaluate: $\lim\limits_{x\to0}\frac{\sqrt{x+2}-\sqrt{2}}{x}$

n)Evaluate: $\lim\limits_{x\to0}\frac{\sqrt{1+x}-\sqrt{1-x}}{x}$

o)Evaluate: $\lim\limits_{x\to0}\frac{\sqrt{1+x+x^2}-1}{x}$

p)Evaluate: $\lim\limits_{x\to1}\frac{x-1}{\sqrt{x^2+3}-2}$

q)Evaluate: $\lim\limits_{x\to1}\frac{\sqrt{3+x}-\sqrt{5-x}}{x^2-1}$

r)Evaluate: $\lim\limits_{x\to5}\frac{x-5}{\sqrt{6x-5}-\sqrt{4x+5}}$

s)Evaluate: $\lim\limits_{x\to7}\frac{4-\sqrt{9+x}}{1-\sqrt{8-x}}$

t)Evaluate: $\lim\limits_{x\to0}\frac{\sqrt{x+4}-2}{\sqrt{x+9}-3}$

a) Evaluate: $\lim_{x \to a} \frac{x^9 - a^9}{x - a}$ Limit's form: $\left[lim_{x \to a} \frac{x^n - a^n}{x - a} \right] = na^{n-1}$

b)valuate: $\lim_{x \to a} \frac{x^{\frac{5}{7}} - a^{\frac{5}{7}}}{x^{\frac{2}{7}} - a^{\frac{2}{7}}}$

c)Evaluate: $\lim_{x \to 3} \frac{x^5 - 243}{x^3 - 27}$

d)Evaluate: $\lim_{x \to a} \frac{x^3 - a^3}{x^2 - a^2}$

e)Evaluate: $\lim_{x \to 4} \frac{x^3 - 64}{x^2 - 16}$

f)Evaluate: $\lim_{x \to 2} \frac{x^7 - 128}{x^5 - 32}$

a)Evaluate: $\lim_{x \to \infty} (\sqrt{x^2 + x} - x)$ put $x = \frac{1}{t} \to t = \frac{1}{x}$ $and\ x \to \infty, t \to 0.$

b)Evaluate: $\lim_{x \to \infty} (\sqrt{x^2 + 1} - \sqrt{x^2 - 1})$

c)Evaluate: $\lim_{x \to \infty} (\sqrt{x^2 + x + 1} - \sqrt{x^2 - x - 1})$

d)Evaluate: $\lim_{x \to \infty} x(\sqrt{x^2 + 4} - \sqrt{x^2 + 1})$

e)Evaluate: $\lim_{x \to \infty} (\sqrt{x^2 + 7x} - x)$

f)Evaluate: $\lim_{x \to \infty} (\sqrt{x^2 + 4x + 16} - \sqrt{x^2 + 16})$

g)Evaluate: $\lim_{x \to \infty} \sqrt{x + 2}(\sqrt{x^2 + 4} - \sqrt{x})$

h)Evaluate: $\lim_{x \to \infty} \frac{1+2+3+\cdots..n}{n^2}$

a)Evaluate: $\lim_{x \to 0} \frac{\sin\ 3x}{5x}$ as$(lim_{x \to 0} \frac{\sin\ x}{x}$=1),$(lim_{x \to 0} \frac{\tan\ x}{x}$=1) $(lim_{x \to 0} \frac{\text{sink}\ x}{kx}$=1)

b) Evaluate: $\lim_{x \to 0} \frac{\tan\ 7x}{sin 5x}$

c)i) Evaluate: $\lim_{x \to 0} \frac{\cos\ 3x - cosx}{x^2}$ ii) Evaluate: $\lim_{x \to 0} \frac{\cos\ 5x - cos 3x}{x^2}$

d) Evaluate: $\lim_{x \to 0} \frac{1 - cos 2x}{3\tan^2 x}$

e)Evaluate: $\lim_{x \to 0} \frac{cosx}{x - \frac{\pi}{2}}$ put $x = \frac{\pi}{2} + h, \therefore x - \frac{\pi}{2} = h\ , as\ x \to \frac{\pi}{2}\ , h \to 0.$

f)Evaluate: $\lim_{x \to 0} \frac{\sin\ 3x}{5x}$

g) Evaluate: $\lim_{x \to a} \frac{\sin\ x - sina}{x - a}$

Formulae: $\left(\lim_{x\to 0}\frac{a^x-1}{x}=\log_e a,\ \lim_{x\to 0}\frac{e^x-1}{x}=1,\ \lim_{x\to\infty}\left(1+\frac{1}{x}\right)^x=e,\ \lim_{x\to 0}(1+x)^{\frac{1}{x}}=e\right)$

a) Evaluate: $\lim_{x\to 0}\frac{5^x-4^x}{x}$

b) Evaluate: $\lim_{x\to\infty}\left(1-\frac{3}{x}\right)^x$

c) Evaluate: $\lim_{x\to 0}\left(1+\frac{3x}{2}\right)^{\frac{1}{x}}$

d) a) Evaluate: $i)\ \lim_{x\to 0}\frac{5^x-4^x}{x}$ ii) $\lim_{x\to 0}\frac{3^x-5^x}{x}$

e) Evaluate: $\lim_{x\to 0}\frac{7^x-1}{\sin x}$

f) Evaluate: $\lim_{x\to 0}\frac{5^x+3^x-2^x-1}{x}$

g) Evaluate: $\lim_{x\to 0}\frac{8^x-4^x-2^x+1}{x^2}$

h) Evaluate: $\lim_{x\to 0}\frac{6^x-3^x-2^x+1}{x^2}$

i) Evaluate: $\lim_{x\to 0}\frac{10^x-2^x-5^x+1}{x\sin x}$

j) Evaluate: $i)\ \lim_{x\to 0}\frac{5^x+3^x-2^x-1}{x}$ $ii)\ \lim_{x\to 0}\frac{4^x+4^{-x}-2}{x\sin x}$

k) Evaluate: $\lim_{x\to 0}\frac{5^{\sin x}-1}{\tan x}$

l) Evaluate: $\lim_{x\to\infty}\left(1+\frac{2}{3x}\right)^x$

m) Evaluate: $\lim_{x\to\infty}\left(\frac{3x+1}{3x-2}\right)^{2x}$

n) Evaluate: $\lim_{x\to 0}\frac{\log(7+x)-\log(7-x)}{x}$ as $\left(\lim_{x\to 0}\frac{\log(1+x)}{x}\right)=1,\left(\lim_{x\to 0}\frac{\log(1+ax)}{x}\right)=a$

o) Evaluate: $\lim_{x\to 0}\frac{\log(3+x)-\log(3-x)}{x}$

p) Evaluate: $\lim_{x\to 0}\frac{\log(5+x)-\log(5-x)}{x}$

q) Evaluate: $\lim_{x\to 5}\frac{\log x-\log 5}{x-5}$

r) Evaluate: i) $\lim_{x\to 3}\frac{\log x-\log 3}{x-3}$ ii) Evaluate: $\lim_{x\to 2}\frac{\log x-\log 2}{x-2}$

s) Evaluate: $\lim_{x \to \frac{\pi}{4}} \frac{\sin x - \cos x}{x - \frac{\pi}{4}}$

TOPIC5: DERIVATIVE'S

a)Using first principle of derivative find derivative of following functions:

1.e^x 2. $3x^2+4$ 3. $\sqrt{x}$ 4. $\log x$ 5. $\sin x$ 6. $\cos x$ 7. $\tan x$ 8. K.

b)If u and v are differentiable functions of x and $y = u + v$,then prove that: $\frac{dy}{dx} = \frac{du}{dx} + \frac{dv}{dx}$.

c)If u and v are differentiable functions of x and $y = u - v$,then prove that: $\frac{dy}{dx} = \frac{du}{dx} - \frac{dv}{dx}$.

d)If u and v are differentiable functions of x and $y = u.v$,then prove that : $\frac{dy}{dx} = u\frac{dv}{dx} + v\frac{du}{dx}$.

e)If u and v are differentiable functions of x and $y = \frac{u}{v}$,then prove that : $\frac{dy}{dx} = \frac{v\frac{du}{dx} - u\frac{dv}{dx}}{v^2}$.

f)Find $\frac{dy}{dx}$ $, if\ i)\ y = x^{10} + 10^x + e^x$ ii) $y = (x+1)(x+2)$. iii) $y = \sec x . \tan x$ iv)$y = e^x . \tan x$

v) $y = \frac{x+1}{x-1}$ vi) $y = \frac{1+\sqrt{x}}{1-\sqrt{x}}$ vii) $y = \frac{\sin x}{1-\cos x}$. viii) $y = \frac{\sin x + \cos x}{\cos x - \sin x}$ ix)$y = \frac{e^x + e^{-x}}{e^x - e^{-x}}$.

f) Differentiate w. r .t .x

i) $\sin(x^2+5)$. ii)$\sec(4x-3)$ iii) $e^{3x}\cos 2x$ iv)$\log(\sin x)$ v) $\tan(x.e^x)$ vi) $(x^2+x+1)^4$

g) Find $\frac{dy}{dx}$ If i) y = $\log(3x^2+2x+1)$ ii) y = $e^{\tan x}$ iii) y = $\sin^2[\log(2x+3)]$ iv) y = $\log(\log x)$.

v) y = $\cos(x^2e^x)$ vi) y = $\cos^{-1}(7x)$ vii) y = $e^{3x} + \tan^4 x$ viii) y = $e^{\sin x}\cos 4x$.

h) Find $\frac{dy}{dx}$ $if\ x^3 + y^3 + 4x^3y = 0$

i) Find $\frac{dy}{dx}$ $if\ x^3 + y^3 = 4xy$

j) Find $\frac{dy}{dx}$ $if\ x^2 + 3y + y^2 = 5$ at(1,1) .

k) Find $\frac{dy}{dx}$ $if\ x^2 + y^2 = 4xy$.

l) Find $\frac{dy}{dx}$, $if\ \sin y = \log(x+y)$

m)Find $\frac{dy}{dx}$ $if\ x^2+y^2+xy-y=0$ at(1,2) .

n)$if\ x^3+y^3=3axy\ ,find\ \frac{dy}{dx}\ at\ the\ point\ \left(\frac{3a}{2},\frac{3a}{2}\right)$.

o)$if\ x^y=e^{x-y}\ ,then\ prove\ that\ \frac{dy}{dx}=\frac{\log x}{(1+\log x)^2}$

p)$if\ e^y=e^x\ ,then\ find\ \frac{dy}{dx}$

q) Find $\frac{dy}{dx}$ $if\ x^2+y^2=25$.

r) Find $\frac{dy}{dx}$ $if\ x^2+3xy-y^2=11\ at\ (1,2)$.

a)$if\ y=e^{2x}.\sec x.\tan 2x$,Find $\frac{dy}{dx}$.

b) $i)if\ y=\frac{(x+1)^4}{(x-1)^3(x+4)^7}$, Find $\frac{dy}{dx}$. $ii)if\ y=\frac{(x-2)^3(x-3)^5}{(x+1)^4}$, Find $\frac{dy}{dx}$.

c)$Find\ \frac{dy}{dx}\ ,if\ y=x^x$.

d)$Differentiate\ (\sin x)^{\tan x}\ w.r.to.x$.

e)$Differentiate\ (\tan x)^{\cot x}\ w.r.to.x$.

f)$Differentiate\ w.r.to.x$. i) $(\log x)^{\log x}$ ii) $(\sin x)^{\cos x}$.

a)$Find\ \frac{dy}{dx}\ ,\ if\ \ x=3at^2\ and\ y=2at^3$.

b)$Find\ \frac{dy}{dx}\ ,\ if\ \ x=a(\theta+\sin\theta)\ and\ y=a(1-\cos\theta)$.

c)$Find\ \frac{dy}{dx}\ ,\ if\ \ x=\frac{2t}{1+t^2}\ and\ y=\frac{1-t^2}{1+t^2}$.

d)$Find\ \frac{dy}{dx}\ ,\ if\ \ x=a(\cos t+t\sin t)\ and\ y=a(\sin t-\mathrm{t}\cos t)$.

e)$Find\ \frac{dy}{dx}\ ,\ if\ \ x=at^2\ and\ y=2at$.

f) $Find\ \frac{dy}{dx}\ ,\ if\ \ x=a(2\theta-\sin 2\theta)\ and\ y=a(1-\cos 2\theta)$.

a)$Differentiate\ \log(x.\sin x)w.r.to\ \frac{1}{x}$.

b)$Differentiate\ \tan^{-1}(4x)\ w.r.to\ \ e^{6x}$.

c)$Differentiate\ (\log x)^x\ \ w.r.to\ 5^{4x}$.

d)$Differentiate\ \tan^{-1}\left(\frac{\sqrt{1-x^2}}{x}\right) w.r.to\ \sin^{-1}(2x.\sqrt{1-x^2})$.

e)$Differentiate\ \tan^{-1}\left(\frac{2x}{1-x^2}\right) w.r.to\ \sin^{-1}\left(\frac{2x}{1+x^2}\right)$.

f)$Differentiate\ \tan^{-1}\left(\frac{2x}{1+x^2}\right) w.r.to\ \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$.

a) $if\ xy = a\ , show\ that\ x.\frac{d^2y}{dx^2} + 2\frac{dy}{dx} = 0$.

b) $if\ y = \sin 5x - 3\cos 5x\ , show\ that\ \frac{d^2y}{dx^2} + 25y = 0$.

c) $if\ y = \sin^{-1} x\ , show\ that\ (1 - x^2).\frac{d^2y}{dx^2} - x\frac{dy}{dx} = 0$.

d) $if\ y = 2\cos(\log x) + 3\sin(\log x)\ , show\ that\ x^2.\frac{d^2y}{dx^2} + x.\frac{dy}{dx} + y = 0$.

e) $if\ y = e^{m.\sin^{-1} x}\ , show\ that\ (1 - x^2).\frac{d^2y}{dx^2} - x\frac{dy}{dx} - m^2y = 0$.

f)$if\ y = ae^{2x} + be^{-2x}\ , show\ that\ \frac{d^2y}{dx^2} - 4y = 0$.

g)$if\ y = A\cos x + B\sin x\ , show\ that\ \frac{d^2y}{dx^2} + y = 0$.

h)$if\ y = \cos(\log x)\ , show\ that\ x^2.\frac{d^2y}{dx^2} - x.\frac{dy}{dx} - y = 0$.

i)$if\ y = 3\sin 4x - 5\cos 4x\ , show\ that\ \frac{d^2y}{dx^2} + 16y = 0$.

j) $if\ y = a\cos(\log x) + b\sin(\log x)\ , show\ that\ x^2.\frac{d^2y}{dx^2} + x.\frac{dy}{dx} + y = 0$.
