Chapter wise question

UNIT-I- MVEC (VECTOR)

OBJECTIVE QUESTIONS

1. The two forces act on a particle at a point. Find their resultant if they are $4\hat{i}+\hat{j}-3\hat{k}$ & $3\hat{i}+\hat{j}-\hat{k}$. **[2019(S)NEW]**
2. Find the value of p so that the vector $2\hat{i}+\hat{j}-\hat{k}$ is perpendicular to the vector $\hat{i}-\hat{j}+p\hat{k}$.**[2019(S)OLD]**
3. Find unit vector in the direction of $\vec{a}=\hat{i}+3\hat{j}+\hat{k}$.**[2019(S)OLD]**
4. Find the unit vector in the direction of the vector $3\hat{i}+\hat{j}+\hat{k}$.**[2019(W)NEW]**

SHORT QUESTIONS

1. Determine the area of the parallelogram whose diagonals are determined by the vectors $\vec{a}=3\hat{i}+\hat{j}-2\hat{k}$ & $\vec{b}=\hat{i}-3\hat{j}+4\hat{k}$.**[2019(S)OLD]**
2. Find the angle between the vectors $\vec{a}=\hat{i}+\hat{j}+3\hat{k}$ & $\vec{b}=2\hat{i}-\hat{k}+4\hat{j}$.**[2019(S)OLD]**
3. Find scalar & vector projection of $\vec{a}$ on $\vec{b}$, where $\vec{a}=\hat{i}+\hat{j}-\hat{k}$ & $\vec{b}=2\hat{i}+2\hat{j}+\hat{k}$. **[2019(W)NEW]**

LONG QUESTIONS

1. Find the vector and scalar projection of $\vec{b}$ on $\vec{a}$, if $\vec{a}=\hat{i}-\hat{j}-\hat{k}, \vec{b}=3\hat{i}+\hat{j}-3\hat{k}$ **[2019(S)OLD]**
2. Find sine angle between the vectors $\vec{a}=2\hat{i}-\hat{j}+3\hat{k}$ & $\vec{b}=\hat{i}+3\hat{j}+2\hat{k}$.**[2019(S)NEW]**
3. (i) Prove sine formula by vector method. (ii) Find the area of the parallelogram whose sides are $\vec{a}=\hat{i}+\hat{j}+\hat{k}$ & $\vec{b}=2\hat{i}+\hat{j}-3\hat{k}$.**[2019(S)OLD]**
4. (ii) Determine the area of the parallelogram, whose adjacent sides are the vectors $2\hat{i}+\hat{j}-\hat{k}$ & $3\hat{i}+\hat{j}-\hat{k}$.**[2019(W)NEW]**

UNIT-II- MLCX(LIMIT &CONTINUITY)

OBJECTIVE QUESTIONS

1. Evaluate $\lim_{x\to 0}\frac{\sin 7x}{\sin 9x}$.**[2019(S)OLD]**
2. Evaluate $\lim_{x\to 1}\left(\frac{\frac{1}{x^2}-\frac{1}{4}}{x-2}\right)$.**[2019(S)NEW]**
3. Examine the existence of $\lim_{x\to \frac{5}{2}}[x]$.**[2019(S)NEW]**
4. Evaluate: $\lim_{x\to 1}\frac{x^2-2x+1}{x^2-x}$.**[2019(S)NEW]**

5. For what value of k $f(x)=\begin{cases}\dfrac{x^2-a^2}{x-a}, & if\ \ x\neq a\\ k & ,\ if\ \ x=a\end{cases}$ is continuous at $x=a$.**[2019(S)NEW]**

6. Evaluate: $\lim\limits_{x\to 0}\left(\dfrac{\tan 7x}{\tan 5x}\right)$.**[2019(S)OLD]**

7. Evaluate $\lim\limits_{x\to 0}\dfrac{\sin 3x}{\sin 2x}$.**[2019(W)OLD]**

8. Evaluate $\lim\limits_{x\to 0}\dfrac{\sin\ px}{\sin\ qx}$.**[2019(W)NEW]**

9. Evaluate $\lim\limits_{n\to\infty}\dfrac{\sqrt{n}-1}{\sqrt{n}+1}$.**[2019(W)NEW]**

SHORT QUESTIONS

1. If $f(x)=\begin{cases}\dfrac{x}{|x|}, when\, x\neq 0\\ 1, when\, x=0\end{cases}$ Examine the continuity of f(x) at x=0. **[2019(S)OLD]**

2. Evaluate $\lim\limits_{x\to 0}\dfrac{\tan x-\sin x}{x^3}$.**[2019(S)OLD]**

3. If $f(x)=\begin{cases}\dfrac{x-|x|}{x}, & x\neq 0\\ 2, & x=0\end{cases}$ at x=0 show that $\lim\limits_{x\to 0} f(x)$ doesn't exist. **[2019(S)NEW]**

4. Evaluate $\lim\limits_{x\to 0}\left(\dfrac{x-x\cos 2x}{\sin^3 2x}\right)$.**[2019(S)NEW]**

5. Evaluate: $\lim\limits_{x\to 0}\left(\dfrac{x\tan x}{1-\cos x}\right)$.**[2019(S)NEW]**

6. Examine the continuity of the function defined by $f(x)=\begin{cases}\dfrac{|x|}{x}, if\ \ x\neq 0\\ 0, if\ \ x=0\end{cases}$ at x=0. **[2019(S)NEW]**

7. Find the values of a and b such that the function f defined by $f(x)=\begin{cases}ax^2+b & if\ \ x<1\\ 1 & if\ \ x=1\\ 2ax-b & if\ \ x>1\end{cases}$ is continuous at x=1. **[2019(W)OLD]**

8. Evaluate $\lim\limits_{x\to 1}\dfrac{2^{x-1}-1}{\sqrt{x}-1}$.**[2019(W)NEW]**

9. Test the continuity of the function $f(x)=\begin{cases}(1+2x)^{\frac{1}{x}}, & if\ \ x\neq 0\\ e^2, & if\ \ x=0\end{cases}$ $at\ x=0$.**[2019(W)NEW]**

LONG QUESTIONS

1. Find the value of a if $\lim\limits_{x\to 2}\dfrac{\log_e(2x-3)}{a(x-2)}=1$.**[2019(S)NEW]**

2. (ii) Evaluate $\lim_{x\to 0} \frac{1-\cos^3 x}{x\sin 2x}$.**[2019(W)NEW]**

UNIT-III-MDER (DERIVATIVE)

OBJECTIVE QUESTIONS

1. If $y = e^{\sin x^2}, find \frac{dy}{dx}$.**[2019(S)OLD]**
2. If $z = \log\left(x^2 - y^2\right)$ find $\frac{\partial z}{\partial x} \& \frac{\partial z}{\partial y}$.**[2019(S)OLD]**
3. If $u = t^2 \& v = \sin t^2$, then find $\frac{dv}{du}$.**[2019(S)NEW]**
4. If $f(x, y) = e^{xy}$, then find $y.\frac{\partial f}{\partial y}$.**[2019(S)NEW]**
5. Find derivative of $\sqrt{x}\ \ w.r.t.\ x^2$. **[2019(S)NEW]**
6. If $y = c_1 e^x + c_2 e^{-x}$, find $\frac{d^2 y}{dx^2}$.**[2019(S)NEW]**
7. Find the derivative of $\sin^{-1} 3x$.**[2019(S)NEW]**
8. Differentiate $\log(\sin\ x)\ w.r.t\ \tan x$.**[2019(S)NEW]**
9. If $z = \tan^{-1}\left(\frac{x}{y}\right), find \frac{\partial z}{\partial x} \ \& \ \frac{\partial z}{\partial y}$.**[2019(S)NEW]**
10. Find $y_1 \& y_2$ if $y = \log(\cos x)$.**[2019(S)NEW]**
11. Find derivative of $e^{3\log x}\ w.r.t. 3x^2$.**[2019(S)OLD]**
12. Determine the slope of the curve $y = \tan x\ \ at\ \ x = \frac{\pi}{4}$. **[2019(S)OLD]**
13. find $\frac{\partial f}{\partial x} \& \frac{\partial f}{\partial y}$ if $f = e^y \tan x$.**[2019(W)OLD]**
14. Find $\frac{dy}{dx}$ of $x = at^2\ \& y = 2at$.**[2019(W)OLD]**
15. Find derivative of $\tan x\ w.r.t.\ \cot x$.**[2019(W)OLD]**
16. Find the derivative of $\sqrt{ax^2 + bx + c}$ with respect to x, where a, b, c are constants. **[2019(W)NEW]**
17. Find $\frac{\partial z}{\partial x} \& \frac{\partial z}{\partial y}$ if $z = \cos^{-1}\left(\frac{x}{y}\right)$.**[2019(W)NEW]**

SHORT QUESTIONS

1. Determine the maximum and minimum value of the function $f(x) = 2x^3 - 15x^2 - 36x + 18$.**[2019(S)OLD]**
2. Find $\frac{dy}{dx}$ if $x = \theta + \sin\ \theta, y = 1 + \cos\theta, at\ \ \theta = \frac{\pi}{4}$.**[2019(S)OLD]**

3. Differentiate $\tan^{-1}\left(\frac{\cos x}{1+\sin x}\right)$.**[2019(S)OLD]**

4. If $y=\tan^{-1}x$, then prove that $(1+x^2)y_2+2xy_1=0$.**[2019(S)NEW]**

5. If $f(x,y)=\frac{2x-3y}{x^2+y^2}$ then find $f_x(1,2)\,\&\,f_y(1,2)$.**[2019(S)NEW]**

6. If $y=\sin^{-1}x$, show that $(1-x^2)\frac{d^{2y}}{dx^2}-x\frac{dy}{dx}=0$.**[2019(S)NEW]**

7. If $y=\tan^{-1}\sqrt{\frac{1-\cos x}{1+\cos x}}$, then find $\frac{dy}{dx}$. **[2019(S)NEW]**

8. Determine the maximum and minimum value of $f(x)=x^3-6x^2+9x+7$.**[2019(S)NEW]**

9. Find $\frac{dy}{dx}$ if $x^y=y^x$ **[2019(S)OLD]**

10. Examine the continuity of the function $f(x)$ at $x=0$ defined by $f(x)=\begin{cases}\frac{\sin 3x}{x}, & if\ \ x\neq 0\\ 3\quad, & if\ \ x=0\end{cases}$ at x=0. **[2019(S)OLD]**

11. Obtain $\frac{dy}{dx}$ when $x=a(\cos u+u\sin u)\ \&\ y=a(\sin u+u\cos u)$.**[2019(S)OLD]**

12. If $u=\frac{x}{y}+\frac{y}{z}+\frac{z}{x},$ then show that $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}+z\frac{\partial u}{\partial z}=0$.**[2019(W)OLD]**

13. Find the extreme values of $f(x)=2x^3+3x^2-12x+7$.**[2019(W)OLD]**

14. Differentiate $5^{\cos x^2}\ w.r.t.\ x$.**[2019(W)NEW]**

15. Find $\frac{dy}{dx}$ if $x=2\cos^3 t\ \&\ y=2\sin^3 t$.**[2019(W)NEW]**

LONG QUESTIONS

1. Find $\frac{dy}{dx}$ *when* $x^y.y^x=1$.**[2019(S)OLD]**

2. Prove that if $z=\sin^{-1}\left(\frac{x^2+y^2}{x+y}\right)$ then $x\frac{\partial z}{\partial x}+y\frac{\partial z}{\partial y}=\tan z$.**[2019(S)OLD]**

3. Differentiate $\tan^{-1}(\sec x+\tan x)$.**[2019(S)NEW]**

4. If $y=(\sin^{-1}x)^2$, show that $(1-x^2)y_2-xy_1-2=0$.**[2019(S)NEW]**

5. Differentiate $\sin^2\left\{\cot^{-1}\sqrt{\frac{1+x}{1-x}}\right\}$.**[2019(S)NEW]**

6. If $y=e^{m\sin^{-1}x}$, then prove that $(1-x^2)\frac{d^2y}{dx^2}-x\frac{dy}{dx}=m^2y$.**[2019(S)OLD]**

7. Differentiate, $\tan^{-1}\left(\frac{\cos x-\sin x}{\cos x+\sin x}\right)$. **[2019(S)OLD]**

8. Determine the maximum and minimum value of the function $f(x)=2x^3-3x^2-12x+6$.**[2019(S)OLD]**

9. If $u=x^2y+y^2z+z^2x$, then prove that $\frac{\partial u}{\partial x}+\frac{\partial u}{\partial y}+\frac{\partial u}{\partial z}=(x+y+z)^2$.**[2019(S)OLD]**

10. If $y=e^{ax}\sin bx$, then prove that $y_2-2ay_1+(a^2+b^2)y=0$. **[2019(W)OLD]**

11. If $z=\sin^{-1}\left(\frac{xy}{x+y}\right)$, then show that $x\frac{\partial z}{\partial x}+y\frac{\partial z}{\partial y}=\tan z$.**[2019(W)OLD]**

12. (i) Differentiate $(\log x)^{\tan x}$.

(ii) If $y=\sin(\sin x)$, prove that $\frac{d^2y}{dx^2}+\tan x\frac{dy}{dx}+y\cos^2 x=0$.**[2019(W)NEW]**

UNIT-IV-MAND (INTEGRATION)

OBJECTIVE QUESTIONS

1. Evaluate $\int_0^1 \frac{dx}{\sqrt{1-x^2}}$.**[2019(S)OLD]**
2. Evaluate $\int e^{5x+3}dx$.**[2019(S)NEW]**
3. Evaluate: $\int_0^1 \frac{1}{1+x^2}dx$.**[2019(S)NEW]**
4. Evaluate: $\int \frac{e^{2x}+1}{e^x}dx$. **[2019(S)NEW]**
5. Integrate $\int \frac{\cos ec^2 x}{1+\cot x}dx$.**[2019(S)OLD]**
6. Evaluate $\int e^x \sin e^x dx$
7. Evaluate $\int_2^4 [x]dx$.**[2019(W)OLD]**
8. Integrate $\int \sqrt{1+\cos 2x}dx$.**[2019(W)NEW]**
9. Integrate $\int \frac{\sec^2 x}{1+\tan x}dx$.**[2019(W)NEW]**

SHORT QUESTIONS

1. Integrate $\int \frac{e^x+e^{-x}}{e^x-e^{-x}}dx$.**[2019(S)OLD]**
2. Evaluate $\int e^x\left(\frac{1}{x}-\frac{1}{x^2}\right)dx$.**[2019(S)NEW]**
3. Find the area bounded by the curve $xy=c^2$, the x-axis and x=2,x=3. **[2019(S)NEW]**
4. Evaluate $\int_0^{\pi/2}\frac{dx}{1+\cot x}$.**[2019(S)NEW]**
5. Evaluate: $\int_0^{\pi/2}\frac{\sqrt{\tan x}}{\sqrt{\tan x}+\sqrt{\cot x}}dx$.**[2019(S)NEW]**
6. Find the area bounded by the curve $y^2=x,\ x=0,\ y=1$.**[2019(S)NEW]**

7. Evaluate $\int_0^{\pi/2} \frac{\cos x}{\cos x + \sin x} dx$.[2019(S)OLD]

8. Evaluate $\int \frac{e^x - e^{-x}}{e^x + e^{-x}} dx$.[2019(S)OLD]

9. Evaluate: $\int_0^{\pi/2} \log \tan x dx$.[2019(W)OLD]

10. Evaluate: $\int e^x \sin x dx$.[2019(W)OLD]

11. Prove that $\int \frac{dx}{\sqrt{a^2 - x^2}} = \sin^{-1}\frac{x}{a} + c$, where c is integrating constant. **[2019(W)NEW]**

LONG QUESTIONS

1. Find the whole area of the circle $x^2 + y^2 = r^2$.**[2019(S)OLD]**
2. Integrate $\int \frac{4x - 9}{x^2 - 5x + 6} dx$.**[2019(S)OLD]**
3. Integrate $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx$.**[2019(S)OLD]**
4. Evaluate $\int \log(1 + x^2) dx$.**[2019(S)NEW]**
5. Evaluate: $\int \frac{4x^2 - x + 3}{(x^2 + 1)(x - 1)} dx$. **[2019(S)NEW]**
6. Evaluate $\int \frac{x}{(x-1)(x^2+4)} dx.$.**[2019(S)OLD]**
7. Evaluate: $\int \frac{2x^2 + x - 4}{(x^2+1)(x-2)} dx$.**[2019(W)OLD]**
8. Find the area of the circle of radius a and whose centre is at origin. **[2019(W)OLD]**
9. Integrate $\int e^{3x} \cos 2x dx$.**[2019(W)NEW]**
10. (i) Integrate $\int e^{\cos^2 x} \sin 2x dx$.**[2019(W)NEW]**
11. (i) Find the value of $\int \frac{\sqrt{\cos x}}{\sqrt{\cos x} + \sqrt{\sin x}} dx$.**[2019(W)NEW]**

UNIT-V-MDEQ(DIFFERENTIAL EQUATION)

OBJECTIVE QUESTIONS

1. Determine the order and degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^{\frac{3}{2}} = \sqrt{1 + \frac{dy}{dx}}$.**[2019(S)OLD]**
2. Solve: $\frac{dy}{dx} = \frac{x}{y}$.**[2019(S)NEW]**
3. Find order and degree of the differential equation $\frac{d^2y}{dx^2} = \left\{2 + \left(\frac{dy}{dx}\right)^3\right\}^{1/2}$.**[2019(S)NEW]**

4. Find the order and degree of the differential equation $\frac{d^2y}{dx^2} = \sqrt{x + \left(\frac{dy}{dx}\right)^5}$ **.[2019(S)OLD]**

5. find order and degree of the differential equation $\frac{d^2y}{dx^2} = \left(\frac{dy}{dx}\right)^{2/3}$ **.[2019(W)OLD]**

6. Solve $\frac{dy}{dx} = e^{x+y}$ **.[2019(W)OLD]**

7. Find order and degree of the differential equation $3\frac{d^2y}{dx^2} = \left\{2 + \left(\frac{dy}{dx}\right)^2\right\}^{\frac{5}{3}}$ **.[2019(W)NEW]**

8. Solve $\frac{dy}{dx} = (x^2+1)(y^2+1)$**.[2019(W)NEW]**

SHORT QUESTIONS

1. Solve $\frac{dy}{dz} = \frac{\sqrt{1-y^2}}{\sqrt{1-z^2}}$ **.[2019(S)OLD]**
2. Solve the differential equation $x(1+y^2)dx + y(1+x^2)dy = 0$ **.[2019(S)NEW]**
3. Solve: $(1+x^2)\frac{dy}{dx} + 2xy - 4x^2 = 0$ **.[2019(W)OLD]**
4. Solve $\frac{dy}{dz} = \frac{\sqrt{1-y^2}}{\sqrt{1-z^2}}$ **.[2019(W)NEW]**

LONG QUESTIONS

1. Solve $4\frac{dy}{dx} + 8y = 5e^{-3x}$ **.[2019(S)NEW]**
2. Solve $\frac{dy}{dx} + \frac{2x}{1+x^2}y = \frac{x^3}{1+x^2}$ **.[2019(S)OLD]**
3. Solve $\frac{dy}{dx} + y\tan x = \sec x$