SOME IMPORTANT QUESTIONS
(CLASS XII) BY RAJPUT SIR

1. Integrate the following:

(a) $\int \cos^4 2x \, dx$ (b) $\int \frac{\sqrt{x^2+1}\left[\log\left(x^2+1\right)-2\log x\right]}{x^4} dx$ (c) $\int \frac{1}{x^2\left(x^4+1\right)^{3/4}} dx$ (d) $\int \frac{\left(x^2+1\right)e^x}{(x+1)^2} dx$

(e) $\int \frac{x^2}{\left(x\sin x+\cos x\right)^2} dx$ (f) $\int \frac{\sin(x-\alpha)}{\sin(x-\beta)} dx$ (g) $\int \frac{1}{x.\left(x^5+1\right)} dx$ (h) $\int \frac{\sin^{-1}\sqrt{x}-\cos^{-1}\sqrt{x}}{\sin^{-1}\sqrt{x}+\cos^{-1}\sqrt{x}} dx$ (i) $\int \frac{x}{\sqrt{7-6x-x^2}} dx$

(j) $\int \frac{1}{\cos(x-a)\cos(x-b)} dx$ (k) $\int e^x\left(\frac{1+\sin x}{1+\cos x}\right) dx$ (l) $\int \frac{1}{(x^2+1)(x^2+4)} dx$ (m) $\int \sqrt{\tan x}+\sqrt{\cot x} \, dx$

(n) $\int \cos x.\cos 2x.\cos 4x.dx$ (o) $\int \frac{1}{\sqrt{\sin^3 x.\sin(x+\alpha)}}.dx$ (p) $\int \frac{3x+5}{x^3-x^2-x+1} dx$ (q) $\int (\log(\log x)+\frac{1}{(\log x)^2}).dx$

2. Evaluate the following as the limit of a sum. (a) $\int_1^3 \left(3x^2+x\right)dx$ (b) $\int_0^2 \left(x+e^{2x}\right)dx$ By Rajput sir

3. Evaluate the following: (i) $\int_0^{\pi/4} \log\left(1+\tan x\right)dx$ (ii) $\int_{-\pi/2}^{\pi/2} \sin|x|+\cos|x|.dx$ (iii) $\int_0^{\pi/2} \log\sin x dx$

(iv) $\int_0^{\pi/2} \frac{x\sin x\cos x dx}{\sin^4 x+\cos^4 x}$ (v) $\int_{-1}^{3/2} \left|x\sin \pi x\right|dx$ (vi) $\int_0^{\pi/2} \frac{x}{\sin x+\cos x} dx$ (vii) $\int_0^{\pi} \frac{x \quad dx}{a^2\cos^2 x+b^2\sin^2 x}$

(viii) $\int_{\pi/6}^{\pi/3} \frac{1}{1+\sqrt{\cot x}} dx$ (ix) $\int_1^4 \left(|x-1|+|x-2|+|x-3|\right)dx$ (x) $\int_{-1}^{2} \left|x^3-x\right|dx$ (xi) $\int_0^1 \tan^{-1}\left(\frac{2x-1}{1+x-x^2}\right)dx$

4. Find the area the first quadrant enclosed by the x-axis, the line $x=\sqrt{3}y$ and the $x^2+y^2=4$.
5. Find the area of the region enclosed by two circles and $x^2+(y-2)^2=4$. $x^2+y^2=4$.
6. Using integration find the area of Δ ABC, whose vertices are A(2, 0) B(4, 5) and C(6, 3).
7. Find the area above x-axis and included in circle $x^2+y^2=8x$ and the parabola $y^2=4x$.
8. Find the area of the region $\{(x,y): y^2 \le 4x, 4x^2+4y^2 \le 9\}$. By Rajput sir
9. Find the area of the circle $x^2+y^2=16$ which is exterior to the parabola $y^2=6x$.

Differential equations

1. Form the family of differential equation represented by the curve

(i) $y=ae^{3x}+be^{-2x}$ (ii) $y = e^x (a \sin x + b \cos x)$ (iii) $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

2. Form the differential equation represented circle passing through origin and center lies on x-axis.
3. Solve the differential equations :

(i). $\sec^2 x\tan y dx+\sec^2 y\tan x dy=0$ (ii) $\frac{dy}{dx}=1+x^2+y^2+x^2y^2$ (iii) $xdy-ydx==\sqrt{\left(x^2+y^2\right)}dx$

(iv) $x\cos\left(\frac{y}{x}\right)\frac{dy}{dx}=y\cos\left(\frac{y}{x}\right)+x$ (vi) $2ye^{\frac{x}{y}}dx+\left(y-2xe^{\frac{x}{y}}\right)dy=0$

4. Solve the differential equt: (i) $x(1+y^2)dx - y(1+x^2)dy = 0$. $y(1) = 0$ (ii) $(x^2+y^2)dx + xy\,dy = 0$, $y(1)=1$
5. At any point on the curve the slope of tangent is twice the slope of the line joining the point of contact to the point(-4,-3) find the equation of the curve passing through (-2,1). By Rajput sir