CALCULAS

Vikasana - CET 2012

CALCULAS
PART-A
MULTIPLE CHOICE QNS

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$1. If\ y = \sqrt{\sin x}, then$

$\frac{dy}{dx} =$

a) $\frac{\cos x}{2\sqrt{\sin x}}$

b) $\frac{\sin x}{2\sqrt{\sin x}}$

c) $\frac{\cos x}{\sqrt{\sin x}}$

d) $\frac{2\cos x}{\sqrt{\sin x}}$

$$2. If. f(x) = x(\sqrt{x} - \sqrt{x+1})$$

$$then. f'(0) =$$

$a)0$

$b)1$

$c)-1$

$d)Infinity$

$$3.\ \frac{d}{dx}\left[\sin^2 \cot^{-1}\sqrt{\frac{1+x}{1-x}}\right]=$$

$a)\, 0$

$b)\, 1/2$

$c)\, -1/2$

$d)\, -1$

$$4. If\ .x = e^{y+e^{y+\cdots\infty}} \quad then. \frac{dy}{dx} =$$

$$a) \frac{1-x}{x}$$

$$b) \frac{x}{1-x}$$

$$c) \frac{1+x}{x}$$

$$d) \frac{x}{1+x}$$

$5.If\ .x=\theta\cos\theta+\sin\theta\ \&\ y=\cos\theta-\theta\sin\theta, then$

$\frac{dy}{dx}\ at.\theta=\frac{\pi}{2}$

$a)-\frac{\pi}{2}$

$b)\frac{2}{\pi}$

$c)\frac{\pi}{4}$

$d)\frac{4}{\pi}$

6. $The.derivative.of\ .\sin^2 x.w.r.t.(\log x)^2 =$

$a)\ \dfrac{x.\sin x.\cos x}{\log x}$

$b)\ \dfrac{2\sin x.\cos x}{(\log x)^2}$

$c)\ \dfrac{\sin^2 x}{2\log x}$

$d)\ x.\log x$

$$7.\ If\ y=\left(x^{x}\right)^{x},\ then\ \left(\frac{dy}{dx}\right)_{x=1}=$$

$a)\ 1+\log 2$

$b)\ 1$

$c)\ -1$

$d)\ 1-\log 2$

$$8.If.f(x)=x^n.then.the.value.of$$

$$f(1)-\frac{f'(1)}{1\dagger}+\frac{f''(1)}{2\dagger}-.............+(-1)^n\frac{f^{(n)}(1)}{n\dagger}$$

is

$a)1$

$b)-1$

$c)0$

$d)\infty$

$$9.\ If\ y=\tan^{-1}\left(\frac{\cos x-\sin x}{\cos x+\sin x}\right),\ then\ \frac{d^2y}{dx^2}=$$

$a)\ 0$

$b)\ \sin 2x$

$c)\ \cos x$

$d)\ -\cos 2x$

10.A point on the curve $y = 6x - x^2$ at which the tangent to the curve is included at an angle of 45^0 to the line x+y=0

a) (-3,9)   b)(-3,-27)

c) (3,9)   d)(0,0)

11.In the curve $x^2y^2=a^2(x^2-a^2)$ if SN varies inversely as the nth power of the abscissa then n is equal to

a)n=2 b)n=3 c) n=4

d)n=1

12. The surface area of a sphere, when its volume if increasing at the same rate as its radius is

a)1 b) $\frac{1}{2\sqrt{\pi}}$ c) 2 d) 4

13.Tangent is drawn to the ellipse $\frac{x^2}{27}+\frac{y^2}{1}=1$ at $(3\sqrt{3}\cos\theta, \sin\theta)$ $\theta \in (0, \pi/2)$ Find the value of θ such that the sum of the intercepts on the coordinate axes by the tangent is minimum

a) pi/3 b) pi/6 c) pi/8 d) pi/4

$\pi/3$

14. $\int (\sin^4 x - \cos^4 x)\,dx =$

a) $\dfrac{\cos 2x}{2} + c$

b) $\dfrac{-\sin 2x}{2} + c$

c) $\dfrac{\sin 2x}{2} + c$

d) $\dfrac{\cos 2x}{2} + c$

$$15.\int \frac{2x^2+3}{(x^2-1)(x^2+4)}dx$$

$$If.I = A\log\frac{x-1}{x+1} + B\tan^{-1}\frac{x}{2}.then.A \& B is$$

$a) -1, 1$

$b) 1, -1$

$c) \frac{1}{2}, \frac{1}{2}$

$d) -\frac{1}{2}, \frac{1}{2}$

16. $\int \frac{a^{x/2}}{\sqrt{a^{-x} - a^{x}}} dx =$

a) $\frac{1}{\log a} \sin^{-1}(a^{x}) + c$

b) $\frac{1}{\log a} \tan^{-1}(a^{x}) + c$

c) $2\sqrt{a^{x} - a^{-x}} + c$

d) $\log(a^{x} - a^{-x}) + c$

$$17.\int \frac{1}{1+\sin x+\cos x}dx =$$

$a)\ \log\left|1+\tan x/2\right| + c$

$b)\ \log\left|1+\sin x+\cos x\right| + c$

$c)\ 2\log\left|1+\tan x/2\right| + c$

$d)\ \frac{1}{2}\log\left|1+\tan x/2\right| + c$

$$18.\int 32x^3.(\log x)^2\,dx =$$

$$a)\ 8x^4(\log x)^2 + c$$

$$b)\ x^4.\left[8(\log x)^2 - 4\log x + 1\right] + c$$

$$c)\ x^4.\left[8(\log x)^2 - 4\log x\right] + c$$

$$d)\ x^3.\left[(\log x)^2 + 2\log x\right] + c$$

$$19.\int_0^3 |2 - x|\,dx =$$

$a)\ 5/2$

$b)\ 1/2$

$c)\ 7/2$

$d)\ 9$

$$20. If\ .I_n = \int_0^{\pi/4} \tan^n x\,dx, then$$

$$\lim_{n\to\infty}\left[I_n + I_{n+2}\right] =$$

$a)1/2$

$b)1$

$c)\infty$

$d)0$

21. The value of $\int_0^{\pi} \frac{dx}{5+3\cos x} =$

a) $\pi/8$

b) $\pi/4$

c) 0

d) $\pi/2$

22. The area between the curves $y = 2x - x^2$ and the x-axis is

a) $8/5$

b) $4/3$

c) $5/3$

d) $7/3$

23.*The.area.enclosed.between.the.curve.*

$y = \log_e(x+e)$ & *the.coordinate.axes.is*

a)2

b)1

c)4

d)3

$$23.If.f(x)=\begin{vmatrix} \sin x+\sin 2x+\sin 3x & \sin 2x & \sin 3x \\ 3+4\sin x & 3 & 4\sin x \\ 1+4\sin x & \sin x & 1 \end{vmatrix}$$

$$then.the.value.of.\int_0^{\pi/2} f(x)dx=$$

$a)3$

$b)2/3$

$c)1/3$

$d))0$

24.The order and the degree of the differential equation

$$\left(1+3\frac{dy}{dx}\right)^{1/3}=4\frac{d^3y}{dx^3}$$ are

a) (1, 2/3)

b) (3, 4)

c) (3, 3)

d) (1, 2)

25. The differential equation of all non-vertical lines in a plane is

$a) \dfrac{d^2y}{dx^2} = 0$

$b) \dfrac{dx}{dy} = 0$

$c) \dfrac{dy}{dx} = 0$

$d) \dfrac{d^2x}{dy^2} = 0$

26.The.solution.of.the.equation.

$$\frac{d^2y}{dx^2} = e^{-2x} \text{ is. } y =$$

a) $\dfrac{e^{-2x}}{4}$

b) $\dfrac{e^{-2x}}{4} + cx + d$

c) $\dfrac{e^{-2x}}{4} + cx^2 + d$

d) $\dfrac{e^{-2x}}{4} + c + d$

CALCULAS
PART-B
MULTIPLE CHOICE QNS

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$$01. If.\ f(x) = e^x, g(x) = \sin^{-1} x \ \&\ h(x) = f(g(x))$$

$$then. \frac{h'(x)}{h(x)} =$$

$a) \sin^{-1} x$

$b) \frac{1}{\sqrt{1-x^2}}$

$c) \frac{1}{1-x^2}$

$d) e^{\sin^{-1} x}$

$02. If\ . y = \sinh e^x, then$

$$\frac{dy}{dx} =$$

$a)\cosh e^x$

$b) -\cosh e^x$

$c) e^x \cosh e^x$

$d) \frac{1}{1+y^2}$

$$03. If\ .f(x)=\cot^{-1}\left[(\cos 2x)^{1/2}\right] then$$

$$f'(\frac{\pi}{6})=$$

$a)\sqrt{\frac{2}{3}}$

$b)\sqrt{\frac{3}{2}}$

$c) 2/3$

$d) 3/2$

$$04. If\ .y = \log \sin^2 \frac{x}{2}, then. \frac{dy}{dx} =$$

$a)\ 2\cot\frac{x}{2}$

$b)\ \tan\frac{x}{2}$

$c)\ \cot\frac{x}{2}$

$d)\ \tan^2\frac{x}{2}$

$$05.The.derivative.of\ .\sin^{-1}\left[\frac{1-x}{1+x}\right] w.r.t \sqrt{x}$$

$$a) -\frac{1}{\sqrt{1-x^2}}$$

$$b) \frac{-2}{1+x}$$

$$c) -\frac{1}{\sqrt{1-x}}$$

$$d) \frac{1}{\sqrt{1-x}}$$

$$06. If\ .y=\tan^{-1}\left[\frac{\log(\frac{e}{x^2})}{\log ex^2}\right]+\tan^{-1}\left[\frac{3+2\log x}{1-6\log x}\right], then \frac{d^{2y}}{dx^2}=$$

$a)1$

$b)-1$

$c)0$

$d)-1/2$

07. The tangent to the curve $x^2 = 2y$ at $\left(1, 1/2\right)$ makes an angle with the x-axis

a) 30^0

b) 90^0

c) 45^0

d) 60^0

08. The Curves $\frac{x^2}{16}+\frac{y^2}{25}=1$ & $\frac{x^2}{a}+\frac{y^2}{16}=1$ cut orthogonally, then, $a=$

a) 6

b) 4

c) 7

d) 9

$09.If.the.subnormal.at.any.point.on.the.curve$

$y^n = ax.is.a.constant.then.n =$

$a)2$

$b)1$

$c)3/2$

$d)-2$

10. The sides of an equilateral triangle are increasing at the rate of 2 cm/sec. The rate at which the area is increases when the side is 10 cm is

a) $\sqrt{3}$ sq.units/sec

b) 10 sq.units/sec

c) $10\sqrt{3}$ sq.units/sec

d) $\frac{10}{\sqrt{3}}$ sq.units/sec

$$11.The.Maximum.value.of.\frac{\log x}{x} =$$

$a)\frac{1}{2}\log 2$

$b)0$

$c)1/e$

$d)1$

$$12. \int \frac{\cos 4x + 1}{\cot x - \tan x} dx = A \cos ecx + B, then$$

$a) A = -1/2$

$b) A = -1/8$

$c) A = -1/4$

$d) A = 1/4$

$$13. \int e^{3\log x} .(x^4 + 1)^{-1} .dx =$$

$a) 1/4 \log(x^4 + 1) + c$

$b) - \log(x^4 + 1) + c$

$c) \log(x^4 + 1) + c$

$d) \dfrac{1}{x^4 + 1} + c$

$$14. \int e^{4x} \sin 6x . \cos 2x dx =$$

$$a) \frac{e^{4x}(\sin 8x - 2\cos 8x)}{40} + \frac{e^{4x}(\sin 4x - \cos 4x)}{16} + c$$

$$b) \frac{e^{4x}(\sin 8x - 2\cos 8x)}{40} - \frac{e^{4x}(\sin 4x - \cos 4x)}{16} + c$$

$$c) -\frac{e^{4x}(\sin 8x - 2\cos 8x)}{40} + \frac{e^{4x}(\sin 4x - \cos 4x)}{16} + c$$

$$d) \frac{e^{4x}(\sin 8x - 2\cos 8x)}{40} - \frac{e^{4x}(\sin 4x - \cos 4x)}{16} + c$$

$$15. \int \frac{e^x(1 + x\log x)}{x} dx =$$

$a) \dfrac{e^x \log x}{x} + c$

$b) e^x(1 + \log x) + c$

$c) e^x \log x + c$

$d) xe^x \log x + c$

$$16. If\ .I_1 = \int \sin^{-1} x dx \ \& \ I_2 = \int \sin^{-1}\sqrt{1-x^2}\, dx, then$$

$a) I_1 = I_2$

$b) I_2 = \frac{\pi}{2} I_1$

$c) I_1 + I_2 = \frac{\pi}{2} x$

$d) I_1 + I_2 = \frac{\pi}{2}$

$$17.\int_0^\infty \frac{dx}{(x^2+4)(x^2+9)} =$$

a) $\frac{\pi}{60}$

b) $\frac{\pi}{20}$

c) $\frac{\pi}{40}$

d) $\frac{\pi}{80}$

18. Evaluate

$$\int_0^{\pi/2} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx =$$

$a)\ \frac{\pi}{4}$

$b)\ \frac{\pi}{2}$

$c)$ Zero

$d)\ 1$

19. $The.Area.of.the.region.bounded.by$

$a^2y^2 = x^2(a^2 - x^2).is:$

a) $\frac{a^2}{2}$ sq.unit

b) $\frac{2a^2}{3}$ sq.unit

c) $\frac{4a^2}{3}$ sq.unit

d) $\frac{a^2}{4}$ sq.unit

20. The Solution of the equation $\frac{dy}{dx} = \cos(x - y)$ is :

a) $y + \cot\left(\frac{x-y}{2}\right) = c$

b) $x + \cot\left(\frac{x-y}{2}\right) = c$

c) $y + \tan\left(\frac{x-y}{2}\right) = c$

d) $x + \tan\left(\frac{x-y}{2}\right) = c$

ALL THE BEST