# Chapter Three

## Short Questions

**1.** Find dy in $y=x^2+2x$ when x changes from 2 to 1.8 . (2017)(E.x# 3.1 Q1 ii)

**2.** If $x\,y+x = 4$ ,find $\frac{dx}{dy}$ by using differentials.(2016)( E.x# 3.1 Q2 i)

**3.** Using differentials find $\frac{dx}{dy}$ $xy - \ln x = c$ .(2015) ( E.x# 3.1 Q2 iv)

**4.** Use differential to approximate the value of $\cos 29°$ .(2015) ( E.x# 3.1 Q3 iii)

**5.** Evaluate $\int \tan^2 x dx$ . (2017)( E.x# 3.2 Q#2 xiv)

**6.** Find $\int a^{x^2} x dx$ . (2017)(Examle #9 pg #134)

**7.** Evaluate $\int \cos 3x \ \sin 2x\, dx.$ (2015)( E.x# 3.2 Q#2 xii)

**8.** Evaluate $\int \frac{ax+b}{ax^2+2bx+c}\, dx$ .(2016)(E.x#3.2 Q2 xi)

**9.** *Evaluate* $\int \sqrt{1-\cos 2x}\, dx$ $,(1-\cos 2x) > 0$ .(2015)( E.x#3.2 Q2 vi)

**10.** Evaluate $\int \frac{\sec^2 x}{\sqrt{\tan x}}\, dx$ .(2016)( E.x#3.2 Q7)

**11.** Evaluate $\int \frac{e^{2x}+e^x}{e^x}\, dx$ . (2019)( E.x# 3.2 Q#1 xi)

**12.** Integrate by substitution $\int \frac{-2x}{\sqrt{4-x^2}} dx$ . (2019)(Ex# 3.3 Q 1)

**13.** Find the integral $\int \frac{\cos x}{\sin x \ln(\sin x)} dx$ . (2019) (E.x# 3.3 Q#15)

**14.** Evaluate $\int \frac{1}{x \ln x}\, dx$ . (2017)(E.x#3.3 Q #4)

**15.** Evaluate $\int \frac{2x}{1-\sin x} dx$ .(2015)( E.x# 3.4 Q# ix)

**16.** Evaluate $\int \frac{e^x(1+x)}{(2+x)^2} dx$ . (2017)(Example #5 pg #147)

**17.** Evaluate $\int x \ln x dx$ . (2017,2015)( ( E.x#3.4 Q#1iii)

**18.** Evaluate $\int \frac{3-x}{1-x+6x^2} dx$ .(2015) (E.x# 3.5 Q#5)

**19.** Evaluate $\int_{-1}^{3} (x^3+3x^2) dx$ .(2015)( Example #1 pg #157)

**20.** Evaluate $\int_0^{\frac{\pi}{6}} x \cos x \, dx$ .(2015)( Example #7 pg #161)

**21.** Find the Area bounded by the curve y = $x^3$+1 the x-axis and the line x = 2.(2015) (E.x# 3.7 Q#7)

**22.** Solve the differential equations $\frac{dy}{dx} = \frac{y^2+1}{e^{-x}}$ . (2015)( E.x# 3.8 Q#1 v)

**23.** Write two properties of definite integral. (2017)(pg #156 c,d)

**24.** Find the area between the x-axis and curve y = 4x-$x^2$ . (2017)( ( E.x#3.7 Q#5)

**25.** Solve the differential equation $\frac{x^2+1}{y+1} = \frac{x}{y}\frac{dy}{dx}$ . (2017) ( E.x#3.8 Q#8)

**26.** Evaluate $\int \frac{1}{\sqrt{x+1}-\sqrt{x}} dx$ .(2016,2015)(Example# 12 v pg 128)

**27.** Evaluate $\int \frac{dx}{x(\ln 2x)^3}$ $x > 0$ .(2015)( Example#8 pg 134)

**28.** Evaluate $\int x^5 \ln x \, dx$.(2015)(Example#4 pg 139)

**29.** Evaluate $\int \frac{2a}{a^2 - x^2} dx$ , $x < a$ .(2015)( Example#3 pg 146)

**30.** Evaluate $\int_{-1}^{2} [x + |x|] dx$ .(2015)(Example#4 pg 159)

**31.** Evaluate $\int_0^3 \frac{dx}{x^2+9}$ .(2015)( E.x#3.6 Q10)

**32.** Evaluate $\int \tan^{-1} x \, dx$ .(2016)( E.x#3.4 Q1 vii)

**33.** Evaluate $\int_2^{\sqrt{5}} x\sqrt{x^2-1} \, dx$ .(2016) ( E.x#3.6 Q#6 )

**34.** Evaluate $\int \frac{e^{\tan^{-1} x}}{1+x^2} dx$ .(2016) (E.x#3.4 Q5 viii)

**35.** Evaluate $\int x^2 \ln x \, dx$ .(2016)( E.x#3.4 Q1 iv)

**36.** Evaluate integral $\int x.\sin x dx$ . (2019)( E.x# 3.4 Q#1 i)

**37.** Find indefinite integral $\int e^{ax}\left[a\sec^{-1} x + \frac{1}{x\sqrt{x^2-1}}\right]dx$ . (2019)( E.x# 3.4 Q#5 iii)

**38.** Evaluate $\int \frac{5x+8}{(x+3)(2x-1)} dx$ by using partial fraction. (2019)( E.x# 3.5 Q#2 iii)

**39.**

**40.** Solve $x^2(2y+1)\frac{dy}{dx} - 1 = 0$ .(2016)( ( E.x#3.8 Q#1 ii)

**41.** Show that $y = \tan(e^x + c)$ *is solution of* $\frac{dy}{dx} = \frac{y^2 + 1}{e^{-x}}$ .(2016) ( E.x#3.8 Q#1 v)

**42.** Evaluate $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \cos t dt$ .( E.x#3.6 Q#11)

**43.** What is differential coefficient? (2019)(pg#124)

**44.** Define Definite integral.(p.g #156)(pg #156)

**45.** State Fundamental theorem of calculus .(p.g 156)( pg #156)

**46.** Define integral. (2019)(pg #124)

**47.** Calculate the integral $\int_0^{\frac{\pi}{4}} \sec x(\sec x + \tan x)dx$. (2019)(Example# 2 pg 158)

**48.** If $\int_{-2}^{1} f(x)dx = 5$, $\int_{-2}^{1} g(x)dx = 4$ then Evaluate $\int_{-2}^{1} \left[3f(x) - 2g(x)\right]dx$ (2019) ( Example#9 pg162)

# Long Question

**1.** Evaluate $\int \frac{\sqrt{2}}{\sin x + \cos x}\, dx$ .(2019) ( E.x#3.3 Q#21)

**2.** Show that $\int \frac{dx}{\sqrt{x^2 - a^2}} = \ln\left(x + \sqrt{x^2 - a^2}\right) + c$ .(2017,2015)( E.x#3.3 Q#8a)

**3.** Show that $\int e^{ax} \sin bx\, dx = \frac{1}{\sqrt{a^2 + b^2}} e^{ax} \sin\left(bx - \tan^{-1}\frac{b}{a}\right) + c$ . (E.x#3.4 Q#3 )(2016)

**4.** Evaluate $\int \left(\frac{1 - \sin x}{1 - \cos x}\right) e^x\, dx$ .(2016)(E.x#3.4 Q#5 xi)

**5.** Evaluate $\int \frac{4 + 7x}{(1+x)^2(2+3x)}\, dx$ .(E.x#3.5 Q#12 )

**6.** Evaluate $\int_0^{\frac{\pi}{4}} \frac{\sec\theta}{\sin\theta + \cos\theta}\, d\theta$ .(2016)( E.x#3.6 Q#21)

**7.** Evaluate $\int_0^{\frac{\pi}{4}} \frac{\sin x - 1}{\cos^2 x} dx$ .(2015)( E.x 3.6 Q 26)

**8.** Evaluate $\int_1^3 \frac{x^2 - 2}{x + 1}\, dx$ .(2017) ( E.x#3.6 Q#24)

**9.** Solve the differential equation $(x^2 - yx^2)\frac{dy}{dx} + y^2 + xy^2 = 0$ .(2019) ( E.x#3.8 Q#12)

**10.** Find the area between the x-axis and the cure $y = \sqrt{2ax - x^2}$ when a>0. ( E.x#3.8 Q#13)(2015)

**11.** Evaluate $\int \frac{3}{x(x^3 - 1)}\, dx$ .(2015)(example #8 pg 149)