

Chapter Three

Multiple Choice Questions

1) $\int (n+1)[x^2 + 2x - 1]^n (2x+2) dx =$

- (a) $(x^2 + 2x - 1)^{n+1} + c$ (b) $\frac{(x^2 + 2x - 1)^{n+1}}{n+1} + c$ (c) $(x^2 + 2x - 1)^{n-1}$ (d) $n(x^2 + 2x - 1)^{n-1}$

2) $\int \frac{d}{dx} (x^2 + 3x) dx =$

- (a) $\frac{x^3}{3} + \frac{3x^2}{2} + c$ (b) $2x + 3$ (c) $x^2 + 3x + c$ (d) $2x+3+c$

3) $\int e^{nx} dx =$

- (a) $e^{nx+1} + c$ (b) $\ln e^{nx} + c$ (c) $\frac{e^{nx}}{n} + c$ (d) $e^{nx} + c$

4) $\int \frac{-1}{\sqrt{1-x^2}} dx =$

- (a) $\tan^{-1} x + c$ (b) $\cot^{-1} x + c$ (c) $\cos^{-1} x + c$ (d) $\sin^{-1} x + c$

5) $\int \left(\sqrt{x} - \frac{1}{\sqrt{x}} \right)^2 dx =$

- (a) $\frac{1}{2}x^2 - 2x + c$ (b) $\frac{1}{2}x^2 - \ln x + c$ (c) $x^2 - x + \ln x + c$ (d) $\frac{1}{2}x^2 - 2x + \ln x + c$

6) $\int \frac{dx}{\sqrt{a^2 - x^2}} =$

- (a) $\cos^{-1} \left(\frac{x}{a} \right) + c$ (b) $\sin^{-1} \left(\frac{a}{x} \right) + c$ (c) $\sin^{-1} \left(\frac{x}{a} \right) + c$ (d) $\sin^{-1} x + c$

7) $\int \sec x dx =$

- (a) $\ln(\sec x + \tan x) + c$ (b) $\ln(\operatorname{cosec} x - \cot x) + c$
(c) $\ln(\sec x - \tan x) + c$ (d) $-\ln(\operatorname{cosec} x - \cot x) + c$

8) $\int e^x [f(x) + f'(x)] dx =$

Prepared By: Prof. Rabia Naz (Assistant professor)

(a) $e^x f'(x) + c$

(b) $e^x f(x) + c$

(c) $f(x) + f'(x) + c$

(d) $e^x [f(x) + f'(x)] + c$

9) $\int_{-\pi}^{\pi} \sin x \, dx = \underline{\hspace{2cm}}$

- a) 0 b) 1 c) 2 d) None of these

10) There are _____ types of solution of differential equations

- (a) 1 b) 2 c) 3 d) 4

11) The area bounded by $y = \cos x$ from $x = \frac{-\pi}{2}$ to $x = \frac{\pi}{2}$ is square unit

- a) 0 b) 1 c) 2 d) 1/2

12) The order of differential equation $x \frac{dy}{dx} + \frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^3 = 1$ is

- a) 3 b) 2 c) 1 d) None of these

13) n arbitrary constants in general solution of a differential equation of order n can be evaluated by _____

- a) initial value conditions b) n initial value conditions c) both a,b d) None of these

14) If $\frac{dy}{dx} = 2x$ & $y(-1) = 0$ then

- a) $y = x^2 + c$ b) $y = x^2 - 1$ c) $y = x^2$ d) $y = x^2 + 1$

15) $\int_0^{\pi} \cos x \, dx =$

- (a) -2 (b) -1 (c) 0 (d) 2

16) $\int_1^2 e^x \left[\frac{1}{x} - \frac{1}{x^2} \right] dx =$

- (a) $e^2 + e$ (b) $\frac{e^2}{2} - e$ (c) $e - \frac{e^2}{2}$ (d) $e^4 - e$

17) If $\int_{-1}^2 f(x) \, dx = 8$, $\int_2^3 f(x) \, dx = ?$ and $\int_{-1}^3 f(x) \, dx = 12$

- (a) 14 (b) 4 (c) 8 (d) 20

Prepared By: Prof. Rabia Naz (Assistant professor)

18) $\int_0^1 \frac{dx}{1+x^2} =$

- (a) $\frac{\pi}{6}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{2}$

19) $\int_0^{\infty} \frac{dx}{1+x^2} =$

- (a) $\frac{\pi}{6}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{2}$

20) If $\frac{d}{dx}(x\sqrt{x+1}) = \frac{3x+2}{2\sqrt{x+1}}$ then $\int_3^8 \frac{3x+2}{2\sqrt{x+1}} dx =$

- (a) 48 (b) 36 (c) 24 (d) 18

21) If $\int_1^2 (3x^2 + 2x - k) dx = 12$ then $k =$

- (a) -1 (b) 0 (c) 1 (d) -2

22) If $\int \ln x dx$ is equals to:

- (a) $\frac{1}{x} \ln x + c$ (b) $x - x \ln x + c$ (c) $x \ln x - x + c$ (d) $x \ln x + x + c$

23) $\int a^x dx =$

- (a) $\frac{ax}{\ln a} + c$ (b) $\frac{\ln a}{ax} + c$ (c) $\frac{l}{an \ln a} + c$ (d) $ax \ln a + c$

24) $\int a^{x-1} dx =$

- (a) $\frac{a^{x-1}}{\ln(a)} + c$ (b) $\frac{a^x}{\ln(a)} + c$ (c) $a^x \ln x + c$ (d) none of them

25) $\int \frac{e^{\tan^{-1} x}}{1+x^2} dx = ?$

- (a) $e^{\sec x} + c$ (b) $e^{\tan x} + c$ (c) $e^{\tan^{-1} x} + c$ (d) $e^{\cot^{-1} x} + c$

26) $\int x^{100} dx$ is:

- a) $100x^{99} + c$ b) $100x^{101} + c$ c) $x^{100} + c$ d) $\frac{x^{101}}{101} + c$

Prepared By: Prof. Rabia Naz (Assistant professor)

27) $\int x \left(\frac{1}{x} + x \right) dx$ is:

- a) $\frac{2}{3}x^{\frac{3}{2}} + x + c$ b) $\frac{2}{3}x^{\frac{3}{2}} + x^2 + c$ (c) $x + \frac{x^3}{3} + c$ d) $\frac{2}{3}x^{\frac{3}{2}} + x^3 + c$

28) Value of $\int_0^{\frac{1}{2}} \left(\frac{1}{\sqrt{1-x^2}} \right) dx$:

- a) π b) $\frac{\pi}{6}$ c) $\frac{\pi}{3}$ d) $\frac{\pi}{4}$

29) $\int_1^2 6x^5 dx$ is equal to:

- a) 73 b) 83 c) 63 d) 53

30) Area of region enclosed between the curve $f(x) = x^2 + 1$ and x-axis from $x = 0$ to $x = 2$ is:

- a) $\frac{14}{3}$ b) 14 c) $\frac{16}{3}$ d) 16

31) Solution of differential equation $\frac{dy}{dx} = \frac{1}{1+x^2}$ is:

- (a) $y = \text{Sec}^{-1} x + c$ (b) $y = \text{Tan}^{-1} x + c$ (c) $y = \text{Sin}^{-1} x + c$ (d) $y = \text{Cosec}^{-1} x + c$

32) If $y = f(x)$ is a differentiable function, then differential of x is defined by the relation.

- (a) $dx = \delta x$ (b) $dx = dy$ (c) $dy = \delta x$ (d) $dx = \delta x$

33) Suitable substitution for expressions involving $\sqrt{a^2 - x^2}$ to be integrated as

- (a) $a = a \sec \theta$ (b) $x = a \tan \theta$ (c) $x = a \cos \theta$ (d) $x = a \sin \theta$

34) $\int \sinh x dx =$:

- (a) $-\cosh x + c$ (b) $\cosh x + c$ (c) $\ln(\cosh x) + c$ (d) $\text{cosec} hx + c$

35) The function $f(x) = 3x^2$ is maximum at:

- (a) 0 (b) 1 (c) 2 (d) 3

Answer Keys

<u>1</u>	<u>a</u>	<u>16</u>	<u>b</u>	<u>31</u>	<u>b</u>
<u>2</u>	<u>c</u>	<u>17</u>	<u>b</u>	<u>32</u>	d
<u>3</u>	<u>c</u>	<u>18</u>	<u>b</u>	<u>33</u>	<u>d</u>
<u>4</u>	<u>d</u>	<u>19</u>	<u>d</u>	<u>34</u>	<u>b</u>
<u>5</u>	<u>d</u>	<u>20</u>	<u>d</u>	<u>35</u>	<u>a</u>
<u>6</u>	<u>c</u>	<u>21</u>	<u>c</u>		
<u>7</u>	<u>a</u>	<u>22</u>	<u>c</u>		
<u>8</u>	<u>b</u>	<u>23</u>	<u>a</u>		
<u>9</u>	<u>A</u>	<u>24</u>	<u>a</u>		
<u>10</u>	<u>b</u>	<u>25</u>	<u>c</u>		
<u>11</u>	<u>c</u>	<u>26</u>	<u>a</u>		
<u>12</u>	<u>b</u>	<u>27</u>	<u>c</u>		
<u>13</u>	<u>c</u>	<u>28</u>	<u>a</u>		
<u>14</u>	<u>b</u>	<u>29</u>	<u>c</u>		
<u>15</u>	<u>c</u>	<u>30</u>	<u>a</u>		

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 $xy + x = 4$,find $\frac{dx}{dy}$ by using differentials.(2016)(2021)(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 $\cos 29^\circ$.(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)
8. Evaluate $\int \frac{2x}{1 - \cos x} dx$.(2015)
9. Evaluate $\int \frac{3-x}{1-x+6x^2} dx$.(2015)
10. Evaluate $\int_{-1}^3 (x^3 + 3x^2) dx$.(2015)
11. Evaluate $\int_0^{\frac{\pi}{6}} x \cos x dx$.(2015)
12. Find the Area bounded by the curve $y = x^3 + 1$ the x-axis and the line $x = 2$.(2015)
13. Solve the differential equations $\frac{dy}{dx} = \frac{y^2 + 1}{e^{-x}}$. (2015)
14. Evaluate $\int \frac{1}{x \ln x} dx$. (2017)(E.x#3.3 Q #4)
15. Evaluate $\int \frac{e^x(1+x)}{(2+x)^2} dx$. (2017)(Example #5 pg #147)
16. Evaluate $\int x \ln x dx$. (2017,2015)(2021)((E.x#3.4 Q#1iii)
17. Write two properties of definite integral. (2017)(pg #156 c,d)
18. Find the area between the x-axis and curve $y = 4x - x^2$. (2017)((E.x#3.7 Q#5)
19. Solve the differential equation $\frac{x^2 + 1}{y + 1} = \frac{x}{y} \frac{dy}{dx}$. (2017) (E.x#3.8 Q#8)

Prepared By: Prof. Rabia Naz (Assistant professor)

20. Evaluate $\int \frac{1}{\sqrt{x+1} - \sqrt{x}} dx$. (2016)(2021)(Example# 12 v pg 128)
21. Evaluate $\int \frac{ax+b}{ax^2+2bx+c} dx$. (2016)(E.x#3.2 Q2 xi)
22. Evaluate $\int \frac{\sec^2 x}{\sqrt{\tan x}} dx$. (2016) (2021)(E.x#3.2 Q7)
23. Evaluate $\int \tan^{-1} x dx$. (2016)
24. Evaluate $\int_2^{\sqrt{5}} x\sqrt{x^2-1} dx$. (2016) (E.x#3.6 Q#6)
25. Evaluate $\int \frac{e^{\tan^{-1} x}}{1+x^2} dx$. (2016)
26. Evaluate $\int x^2 \ln x dx$. (2016)
27. Solve $x^2(2y+1)\frac{dy}{dx} - 1 = 0$. (2016)((E.x#3.8 Q#1 ii)
28. 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)
29. Evaluate $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \cos t dt$. (E.x#3.6 Q#11)
30. What is differential coefficient? (2019)
31. Define Definite integral.(p.g #156)
32. State Fundamental theorem of calculus .(p.g 156)
33. Evaluate $\int \frac{e^{2x} + e^x}{e^x} dx$. (2019)
34. Integrate by substitution $\int \frac{-2x}{\sqrt{4-x^2}} dx$. (2019)
35. Find the integral $\int \frac{\cos x}{\sin x \ln(\sin x)} dx$. (2019)
- $\int x \sin^{-1} x dx$
36. Evaluate integral $\sqrt[4]{17}$. (2019)
- $\frac{1}{x} \frac{dy}{dx} = \frac{1}{2}(1+y^2)$
37. Find indefinite integral $\int a^{ax} \left[a \sec^{-1} x + \frac{1}{x\sqrt{x^2-1}} \right] dx$. (2019)

Prepared By: Prof. Rabia Naz (Assistant professor)

38. Evaluate $\int \frac{5x+8}{(x+3)(2x-1)} dx$ by using partial fraction. (2019)
39. Define integral. (2019)
40. Calculate the integral $\int_0^{\frac{\pi}{4}} \sec x(\sec x + \tan x) dx$. (2019)(2021)
41. If $\int_{-2}^1 f(x) dx = 5$, $\int_{-2}^1 g(x) dx = 4$ then Evaluate $\int_{-2}^1 [3f(x) - 2g(x)] dx$ (2019) (Example#9 pg162)
42. Evaluate $\int \frac{x+b}{(x^2+2bx+c)^{\frac{1}{2}}} dx$. (2021)
43. Evaluate $\int \frac{3x+2}{\sqrt{x}} dx$. (2021)
44. Evaluate $\int e^x(\cos x + \sin x) dx$. (2021)
45. Evaluate $\int \frac{(a-b)x}{(x-a)(x-b)} dx$. (2021)
46. Evaluate $\int_{-1}^1 (x^{\frac{1}{3}} + 1) dx$. (2021)
47. Find the area above the x-axis and under the curve $y = 5 - x^2$ from $x = -1$ to $x = 1$. (2021)
48. Solve the differential Equation $y dx + x dy = 0$. (2021)
49. Use differential to approximate the value of $\sqrt[4]{17}$. (2021) (E.x# 3.1 Q3) (2021)
50. Solve the differential equation $\frac{1}{x} \frac{dy}{dx} = \frac{1}{2}(1 + y^2)$. (2021)

Long Question

1. Evaluate $\int \frac{\sqrt{2}}{\sin x + \cos x} dx$. (2019) (2021) (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)
4. Evaluate $\int \left(\frac{1 - \sin x}{1 - \cos x} \right) e^x dx$. (2016) (E.x#3.4 Q#5 xi)

Prepared By: Prof. Rabia Naz (Assistant professor)

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)

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 curve $y = \sqrt{2ax - x^2}$ when $a > 0$. (E.x#3.7 Q#13)(2015)

11. Evaluate $\int \frac{1}{x(x^3 - 1)} dx$.(2015)

12. Find the area bounded by the curve $y = x^3 - 4x$ and the x-axis. (E.x#3.7)(2021)

13. Evaluate $\int_0^{\frac{\pi}{4}} \frac{1}{1 + \sin x} dx$. (2021)

14. Evaluate $\int x \sin^{-1} x dx$. (2021)

15. Evaluate $\int x^2 \ln x dx$.

Prepared By: Prof. Rabia Naz

(Assistant professor)

Department of Mathematics :Forman Christian College Lahore

Prepared By: Prof. Rabia Naz (Assistant professor)