Maxprap. Chapter wise Series Class 12th – Definite Integration and Area Bounded

Class : 12th **Subject: Mathematics**

Max. Marks : 60 **Duration : 2 Hrs**

Sections: A (MCQs), B (Short Answer-I), C (Short Answer-II), D (Long Answer), E (Case-Based).

General Instructions:

(i). All questions are compulsory.

(ii). This question paper contains 23 questions divided into five Sections A, B, C, D and E. (iii). Section A comprises of 10 MCQs of 1 mark each. Section B comprises of 5 questions of 2 marks each. Section C comprises of 4 questions of 3 marks each. Section D comprises of 4 question of 5 marks each and Section E comprises of 2 Case Study Based Questions of 4 marks each.

(iv). There is no overall choice.

(v). Use of Calculators is not permitted.

Section A

Questions 1 to 10 carry 1 mark each

1. Area bounded by the curve $y = x^3$, the x - axis and the ordinates x = - 2 and x = 1 is

a) $\frac{17}{4}$ b) 2 c) 6 d) 3

2. Area lying in the first quadrant and bounded by the circle $x^2 + y^2 = 4$ and the lines x = 0 and x = 2 is

a) $\frac{\pi}{4}$ b) $\frac{\pi}{3}$ c) $\frac{\pi}{2}$ d) π

3. If the area above the x - axis, bounded by the curves $y = 2^{kx}$ and x = 0, and x = 2 is $\frac{3}{\log_e 2}$ then the value of k is

a) 1 b) - 1 c) $\frac{1}{2}$ d) 2

4. The area bounded by the curve y = x|x|, x - axis and the ordinates x = - 1 and x = 1 is given by

a) $\frac{1}{2}$ b) 0 c) $\frac{2}{3}$ d) 1

5. The area of the region bounded by the curves y =|x - 2| , x = 3, x = 1and the x – axis is

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

6. The area bounded by the curves y = |x - 1| and y = 1 is given by

a) $\frac{1}{2}$ b) 1 c) 2 d) 3

7. The area of the region bounded by the curve y =$\sqrt{16 - x^2}$ and x - axis is

a) 8π sq units b) 16π sq units c) 256π sq units d) 20π sq units

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8. The area of the region bounded by the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$ is

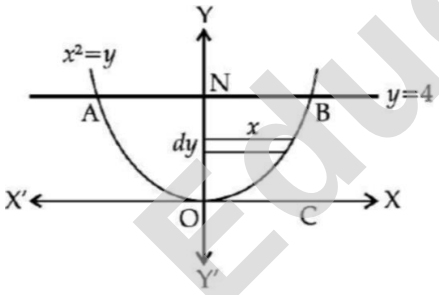
a) 20π sq. units b) $20\pi^2$ sq. units c) 25π sq. units d) $16\pi^2$ sq. units

Assertion(A)/Reason(R) Based (9-10): In the following questions, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

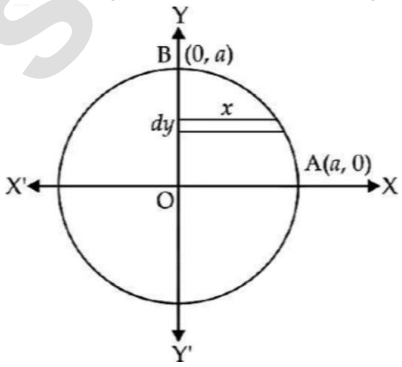
a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

9. Assertion (A): The area of the region bounded by the curve $y = x^2$ and the line $y = 4$ is $\frac{3}{32}$.

Reason (R): Since the given curve represented by the equation $y = x^2$ is a parabola symmetrical about y - axis only, therefore, from figure, the required area of the region AOBA is given by



10. Assertion (A): The area enclosed by the circle $x^2 + y^2 = a^2$ is πa^2.



Reason (R): The area enclosed by the circle $= 4\int_0^a x\,dy$

SECTION – B

Questions 11 to 15 carry 2 marks each

11. Evaluate $\int_0^{\frac{\pi}{2}} \frac{\sin^4 x}{\sin^4 x + \cos^4 x}\,dx$

12. Evaluate: $\int_0^{\frac{\pi}{2}}$ [log (sin x) - log (2 cos x)] dx.

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13. Evaluate: $\int_0^4 \frac{1}{\sqrt{x^2+2x+3}}\,dx$

14. Evaluate $\int_{-6}^{6} |x+2|\,dx$

15. Evaluate $\int_0^1 x\,(1-x)^n dx$

SECTION – C

Questions 16 to 19 carry 3 marks each

16. Sketch the graph $y = |x+1|$. Evaluate $\int_{-4}^{2} |x+1|\,dx$ What does the value of this integral represent on the graph?

17. Find the area of the region lying in the first quadrant and bounded by $y = 4x^2$, x = 0, y = 1 and y = 4.

18. Evaluate the area bounded by the ellipse $\frac{x^2}{4} + \frac{y^2}{9} = 1$ above the x - axis.

19. Find the value of $\int_0^{\pi/4} \log(1+\tan x)dx$

SECTION – D

Questions 20 to 23 carry 5 marks each

20. Find $\int \left(\sqrt{\cot x} + \sqrt{\tan x}\right) dx$

21. Evaluate $\int_0^{\pi} \frac{x}{a^2\cos^2 x + b^2\sin^2 x}\,dx$.

22. Evaluate the definite integral $\int_0^{\frac{\pi}{4}} \frac{\sin x+\cos x}{9+16\sin 2x}\,dx$

23. Evaluate the definite integral $\int_0^{\frac{\pi}{2}} \sin 2x\, \tan^{-1}(\sin x)dx$

SECTION – E (Case Study Based Questions)

Questions 22 & 23 carry 4 marks each

24. Read the following text carefully and answer the questions that follow:

Consider the curve $x^2 + y^2 = 16$ and line y = x in the first quadrant.

a) Find the point of intersection of both the given curves. (1)

b) Evaluate $\int_0^{2\sqrt{2}} x\,dx$. (1)

c) Find the value of the integral $\int_{2\sqrt{2}}^{4} \sqrt{16-x^2}\,dx$. (2)

OR

Find the area bounded by the two given curves. (2)

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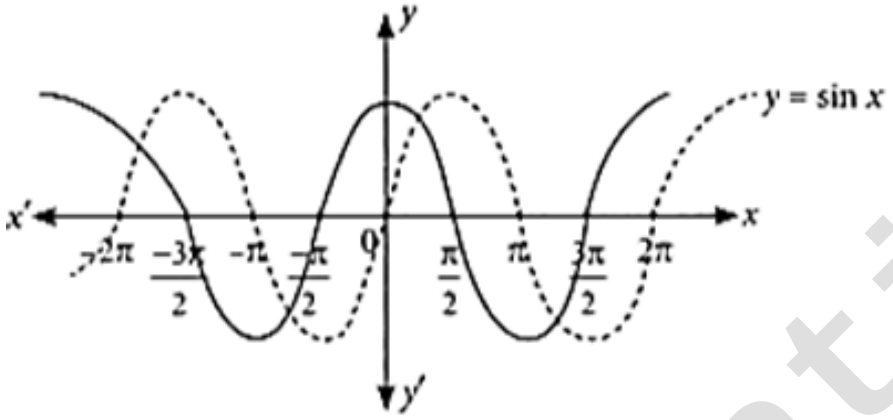
25. Read the following text carefully and answer the questions that follow:

In a classroom, the teacher explains the properties of a particular curve by saying that this particular curve has beautiful up and downs. It starts at 1 and heads down until π radian, and then heads up again and closely related to sine function and both follow each other, exactly $\frac{\pi}{2}$ radians apart as shown in thefigure.



d) Name the curve, about which teacher explained in the classroom. (1)

e) Find the area of curve explained in the passage from 0 to $\frac{\pi}{2}$. (1)

f) Find the area of curve discussed in the classroom from $\frac{\pi}{2}$ to $\frac{3\pi}{2}$. (2)

OR

Find the area of curve discussed in the classroom from $\frac{3\pi}{2}$ to 2π. (2)

Definite Integration and Area Bounded Paper Details – Analysis		
Objective Questions		
MCQ	1 marks x 8 question = 8	
Assertion Reason	1 marks x 2 question = 2	
Subjective		
Short type I	2 marks x 5 question = 10	
Short type II	3 marks x 4 question = 12	
Long Type	5 marks x 4 question = 20	
Case Studies Based		
Case 1	4 marks	
Case 2	4 marks	

Total = 60 marks Your Score =

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