**ACTIVE SITE TUTORIALS**

**Date :** 07-09-2019 **TEST ID: 611**

**Time :** 06:12:00 **MATHEMATICS**

**Marks :** 345

8.APPLICATION OF INTEGRALS

**Single Correct Answer Type**

| 1. | Area enclosed between the curves and is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 2. | The area enclosed by the curve and is | | | | | | | |
|  | a) | sq. units | b) | sq. units | c) | sq. units | d) | None of these |
| 3. | The area of the region enclosed between the curves and is | | | | | | | |
|  | a) | 1 sq. units | b) | 4/3 sq. units | c) | 2/3 sq. units | d) | 2 sq. units |
| 4. | Area enclosed by the curve defined parametrically as is equal to | | | | | | | |
|  | a) | sq. units | b) | sq. units | c) | sq. units | d) | sq. units |
| 5. | Area bounded by the curve and the - axis is | | | | | | | |
|  | a) | sq. units | b) | sq. units | c) | sq. units | d) | None of these |
| 6. | Area bounded by the curves and is | | | | | | | |
|  | a) | sq. units | b) | sq. units | c) | sq. units | d) | sq. units |
| 7. | The area of the loop of the curve, is | | | | | | | |
|  | a) | sq. units | b) | sq. units | c) | sq. units | d) | None of these |
| 8. | The area bounded by the two branches of curve and the straight line is | | | | | | | |
|  | a) | 1/5 sq. units | b) | 3/5 sq. units | c) | 4/5 sq. units | d) | 8/4 sq. units |
| 9. | The area o the region enclosed by the curves and is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 10. | If and , then the area enclosed by and the -axis is | | | | | | | |
|  | a) | sq. units | b) | sq. units | c) | 2 sq. units | d) | 4 sq. units |
| 11. | The area of the region whose boundaries are defined by the curve the -axis is | | | | | | | |
|  | a) | sq. units | | | b) | In 33 In 2 sq. units | | |
|  | c) | 2 sq. units | | | d) | In In 2 sq. units | | |
| 12. | The area bounded by the curve and lines and is | | | | | | | |
|  | a) | sq. units | b) | sq. units | c) | sq. units | d) | None of these |
| 13. | Let minimum for all . Then the area bounded by and the -axis is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 14. | The area inside the parabola but outside the parabola is | | | | | | | |
|  | a) | sq. units | b) | sq. units | c) | sq. units | d) | sq. units |
| 15. | The area of the region of the plane bounded by max and is | | | | | | | |
|  | a) | 1/2 + In 2 sq. units | b) | 3+ In 2 sq. units | c) | 31/4 sq. units | d) | 1+2 In 2 sq. units |
| 16. | The area of the closed figure bounded by and the tangents to it at (1, 1/2) and (4, 2) is | | | | | | | |
|  | a) | 9/8 sq. units | b) | 3/8 sq. units | c) | 3/2 sq. units | d) | 9/4 sq. units |
| 17. | The value of the parameter such that the area bounded by , coordinate axes and the line attains its least value, is equal to | | | | | | | |
|  | a) | sq. units | b) | sq. units | c) | sq. units | d) | sq. units |
| 18. | The area bounded by the curves and , where , is | | | | | | | |
|  | a) | sq. units | b) | sq. units | c) | 2 sq. units | d) | None of these |
| 19. | The area bounded by the curve and the -axis is | | | | | | | |
|  | a) | sq. units | b) | sq. units | c) | sq. units | d) | sq. units |
| 20. | Area bounded by and -axis is | | | | | | | |
|  | a) | sq. units | b) | sq. units | c) | 2 sq. units | d) | sq. units |
| 21. | The area bounded by the loop of the curve is | | | | | | | |
|  | a) | 7/3 sq. units | b) | 8/3 sq. units | c) | 11/3 sq. units | d) | 16/3 sq. units |
| 22. | The area of the region bounded by and is | | | | | | | |
|  | a) | sq. units | b) | sq. units | c) | sq. units | d) | sq. units |
| 23. | The area enclosed between the curves and the axis is | | | | | | | |
|  | a) | 2 sq. units | b) | 1 sq. units | c) | 4 sq. units | d) | None of these |
| 24. | The area of the region bounded by and In is | | | | | | | |
|  | a) | In 2 sq. units | b) | 4 In sq. units | c) | 2 In sq. units | d) | In 2 sq. units |
| 25. | Consider two curve and , where [.] denotes the greatest integer function. Then the area of region enclosed by these two curves within the square formed by the lines is | | | | | | | |
|  | a) | 8/3 sq. units | b) | 10/3 sq. units | c) | 11/3 sq. units | d) | 11/4 sq. units |
| 26. | The area of the region in 1st quadrant bounded by the -axis, and is | | | | | | | |
|  | a) | 2/3 sq. units | b) | 8/3 sq. units | c) | 11/3 sq. units | d) | 13/6 sq. units |
| 27. | The area of the region containing the points satisfying is | | | | | | | |
|  | a) | 8 sq. units | b) | 2 sq. units | c) | sq. units | d) | sq. units |
| 28. | The area bounded by the curves  and is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 29. | The area bounded by and line is | | | | | | | |
|  | a) | sq. units | | | b) |  | | |
|  | c) |  | | | d) | None of these | | |
| 30. | The area bounded by the curve and its inverse function between the ordinates and is | | | | | | | |
|  | a) | sq. units | b) | sq. units | c) | 4 sq. units | d) | 8 sq. units |
| 31. | The area enclosed by the curve , and the -axis is divided by the -axis in the ratio | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 32. | The area between the curve the -axis and the ordinates of the two minima of the curve is | | | | | | | |
|  | a) | 11/60 sq. units | b) | 7/120 sq. units | c) | 1/30 sq. units | d) | 7/90 sq. units |
| 33. | The area bounded by the -axis, the curve and the lines is equal to for all , then is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 34. | The area of the region between the curves  Bounded by the line | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) |  | | |
| 35. | Let be a non-negative continuous function such that the area bounded by the curve , -axis and the ordinates and is . Then is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 36. | The area of the figure bounded by the parabola , the tangent to it at the point with the ordinate and the -axis is | | | | | | | |
|  | a) | 7 sq. units | b) | 6 sq. units | c) | 9 sq. units | d) | None of these |
| 37. | The area bounded by and is | | | | | | | |
|  | a) | In 2 sq. units | b) | In 2 sq. units | c) | 6 In 2 sq. units | d) | None of these |
| 38. | The area of the closed figure bounded by and and the abscissa axis is | | | | | | | |
|  | a) | 16/3 sq. units | b) | 10/3 sq. units | c) | 13/3 sq. units | d) | 7/3 sq. units |
| 39. | The area of the closed figure bounded by and the tangent to the curve at is | | | | | | | |
|  | a) | 4/3 sq. units | b) | 7/3 sq. units | c) | 7/6 sq. units | d) | None of these |
| 40. | The area enclosed between the curves and is 1 sq unit. Then value of is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 41. | The area bounded by the curve , the -axis and the ordinates and is . Then is | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) | None of these | | |
| 42. | The area bounded by the curves and the line is | | | | | | | |
|  | a) | sq. units | b) | sq. units | c) | sq. units | d) | sq. units |
| 43. | The area bounded by the curves and -axis in the first quadrant is | | | | | | | |
|  | a) | 9 | b) | 27/4 | c) | 36 | d) | 18 |
| 44. | Let and is the inverse of it. Then the area bounded by , the -axis and the ordinate at and is | | | | | | | |
|  | a) | 1/4 sq. units | b) | 4/3 sq. units | c) | 5/4 sq. units | d) | 7/3 sq. units |
| 45. | The area enclosed between the curve and the line above the -axis is | | | | | | | |
|  | a) | sq. units | b) | sq. units | c) | sq. units | d) | sq. units |

**Multiple Correct Answers Type**

| 46. | Area bounded by the curve and is | | | | | | | |
|  | a) | sq unit | b) | sq unit | c) | In sq unit | d) | (greater than 3) sq unit |
| 47. | For which of the following values of is the area of the regions bounded by the curve and the line equal to 9/2? | | | | | | | |
|  | a) |  | b) |  | c) | 2 | d) | 4 |
| 48. | Let be the area bounded by the curves and | | | | | | | |
|  | a) | The range of is | | | | | | | |
|  | b) | The range of is | | | | | | | |
|  | c) | If function is defined for , then is many-one function | | | | | | | |
|  | d) | The value of for which area is minimum is 1 | | | | | | | |
| 49. | The value (s) of for which the area of the triangle included between the axes and any tangent to the curve is constant is/are | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | 1 |
| 50. | The parabolas and divide the square region bounded by the lines and the co-ordinate axes. If are the areas of these parts numbered from top to bottom, respectively, then | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 51. | The area enclosed by the curves and is equal to | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) |  | | |
| 52. | If the curve passes through the point (1, 2) and lies above the -axis for and the area enclosed by the curve, the -axis and the line is 8 sq. units. Then | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 53. | Which of the following have the same bounded area | | | | | | | |
|  | a) |  | | | | | | | |
|  | b) |  | | | | | | | |
|  | c) |  | | | | | | | |
|  | d) |  | | | | | | | |
| 54. | If is the area bounded by , where and , then | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Assertion - Reasoning Type** | | | |
| This section contain(s) 0 questions numbered 55 to 54. Each question containsstatement 1(Assertion) and statement 2(Reason). Each question has the 4 choices (a), (b), (c) and (d) out of which **only one** is correct. | | | |
|  | a) | Statement 1 is True, Statement 2 is True; Statement 2 **is** correct explanation for Statement 1 | |
|  | b) | Statement 1 is True, Statement 2 is True; Statement 2 **is not** correct explanation for Statement 1 | |
|  | c) | Statement 1 is True, Statement 2 is False | |
|  | d) | Statement 1 is False, Statement 2 is True | |

|  |  |  |  |
| --- | --- | --- | --- |
| 55 |  | | |
|  | **Statement 1:** | | Let be a real values function satisfying and . Then, the area bounded by the curve , the -axis and the line is sq unit |
|  | **Statement 2:** | | The function is concave down |

|  |  |  |  |
| --- | --- | --- | --- |
| 56 |  | | |
|  | **Statement 1:** | | The area bounded by the curves and the line is least, if |
|  | **Statement 2:** | | The area bounded by the curve and is sq unit |

|  |  |  |  |
| --- | --- | --- | --- |
| 57 | is a polynomial of degree 3 passing through origin having local extrema at | | |
|  | **Statement 1:** | | Ratio of areas in which cuts the circle is 1:1 |
|  | **Statement 2:** | | Both and the circle are symmetric about origin |

|  |  |  |  |
| --- | --- | --- | --- |
| 58 |  | | |
|  | **Statement 1:** | | Area enclosed by the curve between the lines and -axis is |
|  | **Statement 2:** | | is an increasing function |

|  |  |  |  |
| --- | --- | --- | --- |
| 59 | Consider two regions  Point is nearer to (1, 0) than to  Point is nearer to (0, 0) than to (8, 0) | | |
|  | **Statement 1:** | | Area of the region common to and is sq. units |
|  | **Statement 2:** | | Area bounded by and is sq. units |

|  |  |  |  |
| --- | --- | --- | --- |
| 60 |  | | |
|  | **Statement 1:** | | If , then area enclosed by between the lines and -axis is equal to |
|  | **Statement 2:** | |  |

|  |  |  |  |
| --- | --- | --- | --- |
| 61 |  | | |
|  | **Statement 1:** | | The area enclosed between the parabolas and is same as that of bounded by curves and |
|  | **Statement 2:** | | Shifting of origin to point does not change the bounded area |

|  |  |  |  |
| --- | --- | --- | --- |
| 62 |  | | |
|  | **Statement 1:** | | The area bounded by the curves and is least if |
|  | **Statement 2:** | | The area bounded by the curves and is |

|  |  |  |  |
| --- | --- | --- | --- |
| 63 |  | | |
|  | **Statement 1:** | | Area enclosed by the curve is 8 unit |
|  | **Statement 2:** | | represents on square of side length unit |

|  |  |  |  |
| --- | --- | --- | --- |
| 64 |  | | |
|  | **Statement 1:** | | The area of the function from 0 to will be more than that of curve from 0 to |
|  | **Statement 2:** | | , if |

|  |  |  |  |
| --- | --- | --- | --- |
| 65 |  | | |
|  | **Statement 1:** | | The area bounded by parabola and is 4/3 sq. units |
|  | **Statement 2:** | | The area bounded by curve and between ordinates and (where ) is |

|  |  |  |  |
| --- | --- | --- | --- |
| 66 |  | | |
|  | **Statement 1:** | | Area bounded by and is 1 sq. units |
|  | **Statement 2:** | | Area bounded by and is 1 sq. units |

|  |  |  |  |
| --- | --- | --- | --- |
| 67 |  | | |
|  | **Statement 1:** | | Area bounded by is 8 sq. units |
|  | **Statement 2:** | | Area of the square of side length 4 is 16 sq. units |

|  |  |  |  |
| --- | --- | --- | --- |
| 68 |  | | |
|  | **Statement 1:** | | The area of the ellipse will be more than the area bounded by |
|  | **Statement 2:** | | The length of major axis of the ellipse is less than the distance between the points of on -axis |

|  |  |  |  |
| --- | --- | --- | --- |
| 69 |  | | |
|  | **Statement 1:** | | The area of the region bounded by the curve and the pair of lines is sq. units |
|  | **Statement 2:** | | The area of the region bounded by the curves and the pair of lines is units |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Matrix-Match Type** | | | | | | | | | |
| This section contain(s) 0 question(s). Each question contains Statements given in 2 columns which have to be matched. Statements (A, B, C, D) in **columns I** have to be matched with Statements (p, q, r, s) in **columns II**. | | | | | | | | | |

| 70. |  | | | | | | | | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Column-I** | | | **Column- II** | | | |
|  | **(A)** | Area enclosed by for | | (p) | | 8 sq. units | |
|  | **(B)** | Area enclosed by | | (q) | | 6 sq. units | |
|  | **(C)** | Area enclosed by | | (r) | | 4 sq. units | |
|  | **(D)** | Area enclosed by | | (s) | | 12 sq. units | |
|  | **CODES :** | | | | | | | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **A** | **B** | **C** | **D** |  |  |
|  | **a)** | p | q | s | r |  |  |
|  | **b)** | q | s | p | p |  |  |
|  | **c)** | s | p | r | q |  |  |
|  | **d)** | p | r | q | s |  |  |

| 71. |  | | | | | | | | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Column-I** | | | **Column- II** | | | |
|  | **(A)** | Area enclosed by and where and represent greatest integer and fractional part functions, respectively | | (p) | | 32/5 sq. units | |
|  | **(B)** | The area bounded by the curves and | | (q) | | 1 sq. units | |
|  | **(C)** | The smaller area included between the curves and | | (r) | | 4 sq. units | |
|  | **(D)** | Area bounded by the curves (where [.] denotes the greatest integer function), and above the -axis | | (s) | | 2/3 sq. units | |
|  | **CODES :** | | | | | | | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **A** | **B** | **C** | **D** |  |  |
|  | **a)** | r | s | q | p |  |  |
|  | **b)** | p | q | r | s |  |  |
|  | **c)** | q | p | s | r |  |  |
|  | **d)** | s | r | p | q |  |  |

| 72. |  | | | | | | | | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Column-I** | | | **Column- II** | | | |
|  | **(A)** | The area bounded by the curve -axis and the ordinates | | (p) | | 10/3 sq. units | |
|  | **(B)** | The area of the region lying between the lines and the curve | | (q) | | 64/3 sq. units | |
|  | **(C)** | The area enclosed between the curves and | | (r) | | 2/3 sq. units | |
|  | **(D)** | The area bounded by parabola straight line and -axis | | (s) | | 1/6 sq. units | |
|  | **CODES :** | | | | | | | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **A** | **B** | **C** | **D** |  |  |
|  | **a)** | r | p | s | q |  |  |
|  | **b)** | p | s | q | r |  |  |
|  | **c)** | q | r | p | s |  |  |
|  | **d)** | s | q | r | p |  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Linked Comprehension Type**  This section contain(s) 13 paragraph(s) and based upon each paragraph, multiple choice questions have to be answered. Each question has atleast 4 choices (a), (b), (c) and (d) out of which **only one** is correct.  **Paragraph for Question Nos. 73 to -73** | | | | | | | | |
| Let fx=x2-3x+2 be a function, ∀x∈ROn the basis of above information, answer the following questions | | | | |

| 73. | The area bounded by , the -axis and -axis is | | | | | | | |
|  | a) | sq unit | b) | sq unit | c) | sq unit | d) | sq unit |
| **Paragraph for Question Nos. 74 to - 74** | | | | | | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Let there are two functions defined by fx=min(x, x-1, x+1) and gx=min{ex,e-x}. Now, the roots of he equation e-x-x=0 is a,∀ a∈ROn the basis of above information, answer the following questions : | | | | |

| 74. | The area bounded by in and -axis is | | | | | | | |
|  | a) | sq unit | b) | sq unit | c) | sq unit | d) | sq unit |
| **Paragraph for Question Nos. 75 to - 75** | | | | | | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Let Ar be the area of the region bounded between the curves y2=(e-kr)x (where k>0, r∈N) and the line y=mx (where m≠0), k and m are some constants | | | | |

| 75. | are in G.P. with common ratio | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| **Paragraph for Question Nos. 76 to - 76** | | | | | | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| If y=f(x) is a monotonic function in (a, b), then the area bounded by the ordinates atx=a, x=b, y=f(x) and y=f(c) (where c∈(a, b)) is minimum when c=a+b2Proof: A=acfc-fxdx+cbfx-fcdx=fcc-a-acfxdx+cbfxdx-fc(b-c)⇒A=2c-a+bfc+cbfxdx-acfxdxDifferentiating w.r.t. c,dAdc=2c-a+bf'c+2fc+0-fc-fc-0For maximum and minima dAdc=0⇒f'c2c-a+b=0 (as f'(c)≠0)Hence c=a+b2Also for c<a+b2,dAdc<0 and for c>a+b2,dAdc>0Hence A is minimum when c=a+b2 | | | | |

| 76. | If the area bounded by and the straight lines and the -axis is minimum, then the value of is | | | | | | | |
|  | a) | 1/3 | b) | 2 | c) | 1 | d) | 2/3 |
| **Paragraph for Question Nos. 77 to - 77** | | | | | | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Consider the areas S0, S1, S2… bounded by the x-axis and half-waves of the curve y=e-xsinx, where x≥0 | | | | |

| 77. | The value of is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| **Paragraph for Question Nos. 78 to - 78** | | | | | | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Two curves C1≡fy2/3+fx1/3=0 and C2≡fy2/3+fx2/3=12, satisfying the relationfx-yfx+y-x+yfx-y=4xy(x2-y2) | | | | |

| 78. | The area bounded by and is | | | | | | | |
|  | a) | sq. units | b) | sq. units | c) | sq. units | d) | sq. units |
| **Paragraph for Question Nos. 79 to - 79** | | | | | | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Consider the two curves C1:y=1+cosx and C2:y=1+cos(x-α) for α≡0,π2, where x∈[0, π]. Also the area of the figure bounded by the curves C1, C2 and x=0 is same as that of the figure bounded of C2, y=1 and x=π | | | | |

| 79. | The value of is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| **Paragraph for Question Nos. 80 to - 80** | | | | | | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Consider the function defined implicitly by the equation y2-2 yesin-1x+x2-1+x+e2sin-1x=0 (where [x] denotes the greatest integer function) | | | | |

| 80. | The area of the region bounded by the curve and the line is | | | | | | | |
|  | a) | sq. units | b) | sq. units | c) | sq. units | d) | sq. units |
| **Paragraph for Question Nos. 81 to - 81** | | | | | | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Computing area with parametrically represented boundaries:If the boundary of a figure is represented by parametric equation, i.e., x=xt, y=y(t), then the area of the figure is evaluated by one of the three formulasS=-αβytx'tdt, S=αβxty'(t)dt,S=12 αβ(xy'-yx')dt,Where α and β are the values of the parameter t corresponding respectively to the beginning and the end of the traversal of the curve corresponding to increasing t | | | | |

| 81. | The area of the region bounded by an arc of cycloid and the -axis is | | | | | | | |
|  | a) | sq. units | b) | sq. units | c) | sq. units | d) | None of these |

**Integer Answer Type**

| 82. | If ‘ is the value of parameter for each of which the area of the figure bounded by the straight line, and the parabola is the greatest, then the value of is | | | | | | | |
| 83. | If is the sum of possible values of for which the area of the figure bounded by the curves the straight lines and the abscissa axis is equal to 1/2, then the value of is | | | | | | | |
| 84. | The area enclosed by the curve and the -axis is | | | | | | | |
| 85. | If the area enclosed by the curve and the circle above the -axis, is then the value of is | | | | | | | |
| 86. | If the area bounded by the curve and the tangents to it drawn from the origin is , then the value of is | | | | | | | |
| 87. | Let be the area bounded by the curve and the -axis and be the area bounded by the curves and the -axis (where )  The value of such that is | | | | | | | |
| 88. | Area bounded by the relation , is (where represents greatest integer function) | | | | | | | |
| 89. | If the area bounded by the curve and -axis is , then the value of is | | | | | | | |
| 90. | If is the sum of cubes of possible value of ‘’ for which the area of the figure bounded by the curve , then straight lines and and the abscissa axis is equal to 16/3, then the value of , where denotes the greatest integer function, is | | | | | | | |
| 91. | Let be a curve passing through such that the slope of the tangent at any point to the curve is reciprocal of the ordinate of the point. If the area bounded by curve and line is , then the value of is | | | | | | | |
| 92. | Consider two curve and on the plane. Let denotes the region surrounded by and the line and denotes the region surrounded by and the line . If , then the sum of logarithm of possible values of is | | | | | | | |
| 93. | If the area of the region is , then the value of is | | | | | | | |
| 94. | The area bounded by the curves and is (in sq. units): | | | | | | | |
| 95. | The area enclosed by coordinates axes and the ordinates at is 45 square units. If and are the -axis intercepts of the graph of then the value of is | | | | | | | |
| 96. | The value ‘’ for which the area bounded by the curves and has the least value is | | | | | | | |
| 97. | If is the area bounded by the curves and , then the value of | | | | | | | |

**ACTIVE SITE TUTORIALS**

**Date :** 07-09-2019 **TEST ID: 611**

**Time :** 06:12:00 **MATHEMATICS**

**Marks :** 345

8.APPLICATION OF INTEGRALS

|  |
| --- |
| **: ANSWER KEY :** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **1) a 2) a 3) d 4) a**  **5) b 6) b 7) b 8) c**  **9) a 10) b 11) b 12) a**  **13) d 14) a 15) b 16) a**  **17) c 18) d 19) d 20) d**  **21) d 22) a 23) a 24) a**  **25) c 26) c 27) a 28) a**  **29) a 30) d 31) d 32) b**  **33) d 34) b 35) c 36) c**  **37) c 38) a 39) c 40) a**  **41) c 42) a 43) a 44) c**  **45) b 1) b,c,d 2) b,d 3) b,c 4) b,d**  **5) a,c,d 6) a,c,d 7) c,d 8) a,c,d**  **9) a,c 1) b 2) c 3) a 4) b**  **5) d 6) d 7) a 8) c**  **9) a 10) d 11) b 12) a**  **13) b 14) d 15) a 1) b 2) c 3) a 1) d 2) d 3) b 4) d**  **5) a 6) b 7) c 8) a**  **9) b 1) 3 2) 6 3) 9 4) 8**  **5) 2 6) 4 7) 3 8) 9**  **9) 2 10) 8 11) 1 12) 6**  **13) 8 14) 8 15) 1 16) 2** | | | | |

**ACTIVE SITE TUTORIALS**

**Date :** 07-09-2019 **TEST ID: 611**

**Time :** 06:12:00 **MATHEMATICS**

**Marks :** 345

8.APPLICATION OF INTEGRALS

|  |
| --- |
| **: HINTS AND SOLUTIONS :** |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | **(a)**  Z:\Data Typing Files\Sujata\Cengage Physics\4.jpg  The dotted area is  Hence, area bounded by circle and  lined area  Area of circle area bounded by | | | | | | | |
| 2 | **(a)**  The two curves are  (1)  and  (2)  Curve (1) is symmetrical about -axis, and have -axis as the asymptote  Curve (2) is symmetrical about -axis, tangent at origin as -axis and the asymptote  The two curves intersect at the point and  Z:\Data Typing Files\Sujata\Cengage Physics\25.jpg  Required area  (integrating along -axis)  sq. units | | | | | | | |
| 3 | **(d)**  Z:\Data Typing Files\Sujata\Cengage Physics\23.jpg  sq. units | | | | | | | |
| 4 | **(a)**  Clearly can be any real number  Let  , and  Thus, required area sq. units | | | | | | | |
| 5 | **(b)**  The given curve is symmetrical about -axis, and meets it at  The line i.e., -axis is an asymptote (tangent at infinitly)  Area  Z:\Data Typing Files\Sujata\Cengage Physics\8.jpg | | | | | | | |
| 6 | **(b)**  Given curves are and  Solving and  Also, for  For  for all  and when  From these information, we can plot the graph of the functions  Z:\Data Typing Files\Sujata\Cengage Physics\31.jpg  Then the required area  sq. units | | | | | | | |
| 7 | **(b)**  Curve tracing:  We must have  For and for  Also  Curve is symmetrical about -axis  When  Also, it can be verified that has only one point of maxima for  Z:\Data Typing Files\Sujata\Cengage Physics\22.jpg  Area | | | | | | | |
| 8 | **(c)**  , where  (1)  (2)  Function (1) is an increasing function  Function (2) meets -axis, when or  Also, for and for  When  From these information, we can plot the graph as below:  Z:\Data Typing Files\Sujata\Cengage Physics\30.jpg  Required area | | | | | | | |
| 9 | **(a)**  Curve tracing:  Clearly,  For , and for  Also  Further, , which is a point of minima  Z:\Data Typing Files\Sujata\Cengage Physics\5.jpg  Required area | | | | | | | |
| 10 | **(b)**  where  , where  , where    Area | | | | | | | |
| 11 | **(b)**  Solving , we get  Z:\Data Typing Files\Sujata\Cengage Physics\11.jpg  Required area | | | | | | | |
| 12 | **(a)**  Z:\Data Typing Files\Sujata\Cengage Physics\40.jpg  From figure | | | | | | | |
| 13 | **(d)**  Z:\Data Typing Files\Sujata\Cengage Physics\3.jpg  Required area = shaded region  (integrating along -axis) | | | | | | | |
| 14 | **(a)**  Given , and (1)  Z:\Data Typing Files\Sujata\Cengage Physics\2.jpg  (2)  Eliminating , we get  required area  sq. units | | | | | | | |
| 15 | **(b)**  , and  Which represent square bounded by and  Z:\Data Typing Files\Sujata\Cengage Physics\29.jpg  Required area is lined area  Now, shaded area is  Horizontal lined area sq. units | | | | | | | |
| 16 | **(a)**  Tangent at is or  Tangent at (4, 2) is or  Z:\Data Typing Files\Sujata\Cengage Physics\15.jpg  Hence, | | | | | | | |
| 17 | **(c)**  is clearly positive for all real values of . Area under consideration  , which is clearly minimum for | | | | | | | |

|  |  |
| --- | --- |
| 18 | **(d)**  The required area is shown shaded in figure  Z:\Data Typing Files\Sujata\Cengage Physics\37.jpg |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 19 | **(d)**  The curve is , which is a cubic polynomial  Since has repeated root , it touches -axis at (0, 0) and intersects at  Z:\Data Typing Files\Sujata\Cengage Physics\13.jpg  Required area sq. units | | | | | | | |
| 20 | **(d)**  is maximum when . Also, graph is symmetrical about line  Z:\Data Typing Files\Sujata\Cengage Physics\7.jpg  Area sq. units | | | | | | | |
| 21 | **(d)**  (1)  Z:\Data Typing Files\Sujata\Cengage Physics\24.jpg  Area  Let | | | | | | | |
| 22 | **(a)**  Z:\Data Typing Files\Sujata\Cengage Physics\17.jpg | | | | | | | |
| 23 | **(a)**  For shift the graph of units left hand side  Z:\Data Typing Files\Sujata\Cengage Physics\6.jpg  Required area  sq. units | | | | | | | |
| 24 | **(a)**  Z:\Data Typing Files\Sujata\Cengage Physics\21.jpg  Required area sq. units | | | | | | | |
| 25 | **(c)**  For  Similarly, for and would transform into  Z:\Data Typing Files\Sujata\Cengage Physics\38.jpg  The required area is being shaded | | | | | | | |
| 26 | **(c)**  Z:\Data Typing Files\Sujata\Cengage Physics\14.jpg | | | | | | | |
| 27 | **(a)**  The points in the required region satisfy  (1)  Since the curve (1) is symmetrical about both the axes, the required area is 4 times the area of the region in the first quadrant. Therefore, it is sufficient to sketch the region and to find the area in the first quadrant  In the first quadrant, the curve (1) consist of two curves  , and    Z:\Data Typing Files\Sujata\Cengage Physics\32.jpg  Required area = 4 area  (area of semi-circle ) area of sector  (area of semi-circle ) (area of sector area of triangle )  sq. units | | | | | | | |
| 28 | **(a)**  The points of intersection of given curves and line are  D:\Common Folder\Data Typing Files\Sujata\scan\21. Aplication of integrals\sol 1.55.jpg | | | | | | | |
| 29 | **(a)**  Z:\Data Typing Files\Sujata\Cengage Physics\10.jpg  Integrating along -axis, we get  Integrating along -axis, we get | | | | | | | |
| 30 | **(d)**  Curve tracing :  Also when  Hence, are points of inflection, where curve changes its concavity  Also for ,  And for  From these information, we can plot the graph of and its inverse  Z:\Data Typing Files\Sujata\Cengage Physics\34.jpg  Required area , where | | | | | | | |
| 31 | **(d)**  Intersect at  Z:\Data Typing Files\Sujata\Cengage Physics\19.jpg  Area to the left of -axis is  Area to the right of -axis  ratio | | | | | | | |
| 32 | **(b)**  The curve is  The curve is symmetrical about the axis of  Also, it is a polynomial of 4 degree having roots 0, 0, is repeated root. Hence, graph touches at (0, 0)  The curve intersects the axes at and  Thus, the graph of the curve is show in figure  Z:\Data Typing Files\Sujata\Cengage Physics\12.jpg  Here, , as varies from to  The required area  Area  sq. units | | | | | | | |
| 33 | **(d)**  Area | | | | | | | |
| 34 | **(b)** | | | | | | | |
| 35 | **(c)**  Differentiating both sides w.r.t. , we get | | | | | | | |
| 36 | **(c)**  Given parabola is  When  Tangent at (2, 3) is  Z:\Data Typing Files\Sujata\Cengage Physics\27.jpg  required area | | | | | | | |
| 37 | **(c)**  Z:\Data Typing Files\Sujata\Cengage Physics\28.jpg  First consider  For  For  Consider  For  For  Required area | | | | | | | |
| 38 | **(a)**  Z:\Data Typing Files\Sujata\Cengage Physics\16.jpg | | | | | | | |
| 39 | **(c)**  Given  This is a parabola with vertex at and the curve is concave upwards  Equation of the tangent at is  Z:\Data Typing Files\Sujata\Cengage Physics\9.jpg  Required (shaded) area = area area  Now, area  Area of  required area sq. units | | | | | | | |
| 40 | **(a)**  The points of intersection of given curves are (0,0) and  Z:\Data Typing Files\Sujata\scan\30.jpg | | | | | | | |
| 41 | **(c)**  Given  Differentiating both sides w.r.t. , we get | | | | | | | |

|  |  |
| --- | --- |
| 42 | **(a)**  Curve tracing:  Let  Also, at changes sign from to , hence, is a point of minima  When  Also  With similar types of arguments, we can draw the graph of  Z:\Data Typing Files\Sujata\Cengage Physics\26.jpg  Required area |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 43 | **(a)**  D:\Common Folder\Data Typing Files\Sujata\scan\21. Aplication of integrals\sol 1.70.jpg | | | | | | | |
| 44 | **(c)**  The required area will be equal to the area enclosed by -axis between the abscissa  At and  Hence,  Z:\Data Typing Files\Sujata\Cengage Physics\33.jpg | | | | | | | |
| 45 | **(b)**  The required area  Z:\Data Typing Files\Sujata\Cengage Physics\39.jpg  Put | | | | | | | |
| 46 | **(b,c,d)**  Required area  \\SERVER\Common Folder\Data Typing Files\Sujata\AIEEE Maths all structures\29 II sol 14.jpg  sq unit (b is correct)  sq unit (c is correct)  Also,  , which is false | | | | | | | |
| 47 | **(b,d)**  The two curves meet at or  But if and is , then | | | | | | | |
| 48 | **(b,c)**    Line passes through fixed point (0, 2) for different value of  Also, it is obvious that minimum occurs when as when line is rotated from this position about point (0, 2) the increased part of area is more than the decreased part of area  Minimum area | | | | | | | |
| 49 | **(b,d)**  Given curve …(i)  is a point on the given curve  Now, differentiating Eq. (i) , we get  At  Equation of tangent at is  ,  Now,  Area,  Now,  For maxima or minima, put | | | | | | | |
| 50 | **(a,c,d)**  and meet at and    Now  And  Hence, | | | | | | | |
| 51 | **(a,c,d)**  Eliminating , we have  Z:\Data Typing Files\Sujata\Cengage Physics\51.jpg  From diagram, | | | | | | | |
| 52 | **(c,d)**  Since the curve passes through the point (1, 2)  (1)  By observation the curve also passes through (0, 0)  Therefore, the area enclosed by the curve, -axis and is given by  (2)  Solving (1) and (2), we get | | | | | | | |
| 53 | **(a,c,d)**  Z:\Data Typing Files\Sujata\Cengage Physics\322.jpg  We know that area bounded by and -axis for is 2 sq. units  Then area bounded by and is 4 sq. units for  Then for , the area bounded is 20 sq. units  Z:\Data Typing Files\Sujata\Cengage Physics\323.jpg  The area bounded by and for is 4 sq. units  Then for , the area bounded is 40 sq. units  Z:\Data Typing Files\Sujata\Cengage Physics\324.jpg  The area bounded by and for is 4 sq. units  Then for , the area bounded is 20 sq. units  Similarly, the area bounded by and for is 20 sq. units | | | | | | | |
| 54 | **(a,c)**    So the three loops from to are alike  Now area of th loop (square)  So,  So the areas form a G.P. series  So, the sum of the G.P. upto infinite terms | | | | | | | |
| 55 | **(b)**  Given, …(i)  On putting , then  [from Eq. (i)]  Put , then  (say)  \\SERVER\Common Folder\Data Typing Files\Sujata\AIEEE Maths all structures\29 II sol 18.jpg  Required area  sq unit  is concave down | | | | | | | |
| 56 | **(c)**  The given curves are  …(i)  and …(ii)  Solving Eqs. (i) and (ii), we get  are the roots of the quadratic, then  hence, required area  For least value of | | | | | | | |
| 57 | **(a)**  Statement 2 is correct as is odd and hence statement 1 is correct | | | | | | | |
| 58 | **(b)**  Since,  is an increasing function  And area bounded by the curve between the lines and -axis | | | | | | | |
| 59 | **(d)**  points is nearer to (1, 0) than to  Point lies inside parabola  Point is nearer to (0, 0) than to  Point is towards left side of line  The area of common region of and is the area bounded by and  Z:\Data Typing Files\Sujata\Cengage Physics\6.jpg  Z:\Data Typing Files\Sujata\Cengage Physics\6-1.jpg  This area is twice the area bounded by and  Now, the area bounded by and is  Hence, the area bounded by and is sq. units  Thus, statement 1 is false but statement 2 is true | | | | | | | |
| 60 | **(d)**  It is clear from the figure for  \\SERVER\Common Folder\Data Typing Files\Sujata\AIEEE Maths all structures\29 II sol 19.jpg  Required area | | | | | | | |
| 61 | **(a)**  Given curves are and  or and  Shifting origin to , equation of given curves change to and  Hence, statement 1 is true and statement 2 is correct explanation of statement 1 | | | | | | | |
| 64 | **(d)**  For | | | | | | | |
| 65 | **(b)**  Area  sq. units  Statement 1 is true  Obviously, statement 2 is true, but does not explain statement 1 | | | | | | | |
| 66 | **(a)**  Since and are inverse to each other  Z:\Data Typing Files\Sujata\Cengage Physics\111.jpg | | | | | | | |
| 67 | **(b)**  and , which forms a square of diagonal length 4 units  Z:\Data Typing Files\Sujata\Cengage Physics\7.jpg  The area of the region is sq. units  This is equal to the area of the square of side length | | | | | | | |
| 68 | **(d)**  Area of ellipse is  (approx.) sq unit, the area bounded by is  \\SERVER\Common Folder\Data Typing Files\Sujata\AIEEE Maths all structures\29 II sol 20.jpg  and length of major axis | | | | | | | |
| 69 | **(a)**  Z:\Data Typing Files\Sujata\Cengage Physics\5.jpg  and are inverse of each other  The shaded area is given as sq. units  The required area is sq. units | | | | | | | |
| 70 | **(b)**  **a**. , where    **b**.  The graph is symmetrical about both -axis and -axis  For  and and or and    **c**.  The graph is symmetrical about both -axis and -axis  For and or and    **d**. , where  The graph is symmetrical about both the axes  For  and or and | | | | | | | |
| 71 | **(c)**  **a**. Area sq. Units    **b**. and , both the curve are symmetric about -axis  Z:\Data Typing Files\Sujata\Cengage Physics\2b.jpg  The required area sq. units  **c**.  Z:\Data Typing Files\Sujata\Cengage Physics\c.jpg  The curve is symmetrical about -axis  and  for  , function is decreasing, the required area  sq. units  **d**. If then  If , then , and so on  Intersection of and . We get  Intersection of and  We get  Similarly, will not intersect at any other integral, except in the interval  The required area (shaded region)  sq. units  C:\Users\Whalesoft\Desktop\d.jpg | | | | | | | |
| 72 | **(a)**  **a**. Z:\Data Typing Files\Sujata\Cengage Physics\1.jpg  Required area  b. Z:\Data Typing Files\Sujata\Cengage Physics\b.jpg  **c**. Reqd. area  Z:\Data Typing Files\Sujata\Cengage Physics\c.jpg  **d**. meets the parabola at is (16, 4)  Z:\Data Typing Files\Sujata\Cengage Physics\d.jpg  Required area = Area of rectangle Area | | | | | | | |
| 73 | **(d)**  Required area  \\SERVER\Common Folder\Data Typing Files\Sujata\AIEEE Maths all structures\29 II sol 24.jpg | | | | | | | |
| 74 | **(d)**  Graph of  \\SERVER\Common Folder\Data Typing Files\Sujata\AIEEE Maths all structures\29 II sol 29.jpg  and graph of    Required area | | | | | | | |
| 75 | **(b)**  Solving the two equations,  Z:\Data Typing Files\Sujata\Cengage Physics\1-2.jpg  So,  Now, constant  So, the sequence is in G.P.  Sum of terms  Sum of infinite terms | | | | | | | |
| 76 | **(d)**  (note that is monotonic in (0, 2))  Hence for the minimum and must cross the -axis at  Hence, | | | | | | | |
| 77 | **(a)**  Since , the curve is bounded by the curves and  Z:\Data Typing Files\Sujata\Cengage Physics\6-8.jpg  Also, the curve intersects the positive semi-axis at the points where , where  Also coordinate in the half-wave |  , and in  and  the sequence forms an infinite G.P. with common ratio | | | | | | | |
| 78 | **(b)**  Given  Now equations of given curves are  (1)  (2)  Z:\Data Typing Files\Sujata\Cengage Physics\9-11.jpg  Solving equations (1) and (2), we get  The area bounded by curves  sq. units | | | | | | | |
| 79 | **(c)**  Z:\Data Typing Files\Sujata\Cengage Physics\12-13.jpg  Now  Hence, | | | | | | | |
| 80 | **(a)**  For  For  Total area | | | | | | | |
| 81 | **(b)**  sq. units | | | | | | | |
| 82 | **(3)**  (1)  (2)  Point of intersection of (1) and (2)  Req. area  is max is  Then | | | | | | | |
| 83 | **(6)**    Area  Area  is symmetric about origin  So , because area area  So | | | | | | | |
| 84 | **(9)**  Required area  ; Put | | | | | | | |
| 85 | **(8)**  Required area = area of one quadrant of the circle | | | | | | | |
| 86 | **(2)**  Let the point of the curve is  Now, the slope of tangent at this point is , which is equal to the slope of the line joining and (0, 0)  Hence    Hence equation of tangent is  Now area | | | | | | | |
| 87 | **(4)**  We have , so where  Now    Hence | | | | | | | |
| 88 | **(3)**  Similarly we can consider and 5    From the graph, area is 3 sq. units | | | | | | | |
| 89 | **(9)**  Graph of is as | | | | | | | |
| 90 | **(2)**    Given than  Area  So  Hence and | | | | | | | |
| 91 | **(8)**    Let be any point on the curve  Now,  Since the curve passes through , so  Hence required area  (square unit) | | | | | | | |
| 92 | **(1)**  Given that  Z:\Data Typing Files\Sujata\Cengage Physics\14.jpg | | | | | | | |
| 93 | **(6)**  Draw the given region point of intersection of    Required area | | | | | | | |
| 94 | **(8)**  Required area sq. units | | | | | | | |
| 95 | **(8)**  gives  Hence  Hence and | | | | | | | |
| 96 | **(1)**  Let  which is point of minima | | | | | | | |
| 97 | **(2)**  (1)  in (2) (2)    Required area area of region  Area of semi-circle  ( area of area of ) | | | | | | | |