Question Paper

* * INTEGRATION AND VECTOR C

ALCULUS QUESTION PAPER**

MARCH 2023 EXAMINATION **Question Paper**

Instructions:

* All questions are to be answered in the space provided.
* For MCQ (Multiple Choice Questions), choose the correct answer from the options provided.
* For SAQ (Short Answer Questions), answer each question in not more than 3 lines.
* For LAQ (Long Answer Questions), answer each question in not more than 5 pages (double-spaced).
* Use of calculators and logarithmic tables is allowed.
* All answers must be clearly written and neatly presented.

MARKS DISTRIBUTION:

* MCQ (Multiple Choice Questions): 25 questions x 1 mark each = 25 marks
* SAQ (Short Answer Questions): 15 questions x 3 marks each = 45 marks
* LAQ (Long Answer Questions): 6 questions x 5 marks each = 30 marks
* **Total Marks:** 100

SECTION A: MULTIPLE CHOICE QUESTIONS (25 MARKS)

1. If **?(2x+1) / x^2 dx** is to be evaluated using substitution method, what should be the substitution? (1 mark)

   a) u = x^2

   b) u = 2x+1

   c) u = x+1

d) u = 1/x

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2. The value of **?e^(2x) dx** is: (1 mark)

a) e^(2x) / 2 + C

b) (e^(2x) / 2) + C

c) e^(2x) + C

d) (e^(2x) + C) / 2

3. Which of the following integral is a basic integral? (1 mark)

a) ?x^2 dx

b) ?e^x dx

c) ?sin(x) dx

d) All of the above

4. If **?(x^2 + 1) / (x^2 - 1) dx** is to be evaluated using partial fractions, what should be the partial fractions? (1 mark)

a) 1 / (x - 1) + 1 / (x + 1)

b) 1 / (x - 1) - 1 / (x + 1)

c) (x^2 + 1) / (x^2 - 1)

d) (x^2 - 1) / (x^2 + 1)

5. If **?(2x - 1) / (x^2 + 1) dx** is to be evaluated using substitution method, what should be the substitution? (1 mark)

a) u = x^2 + 1

b) u = 2x - 1

c) u = x - 1

6. Evaluate **?(e^x + sin(x)) dx**. (1 mark)

a) e^x - cos(x) + C

b) e^x + cos(x) + C

c) e^x - sin(x) + C

d) e^x + cos(x) - C

7. If **?(1 + x^2) / (x + 1) dx** is to be evaluated using partial fractions, what should be the partial fractions? (1 mark)

a) 1 / (x + 1) + x / (x + 1)

b) 1 / (x + 1) - x / (x + 1)

c) (1 + x^2) / (x + 1)

d) (x + 1) / (1 + x^2)

8. Evaluate **?(e^x + cos(x)) dx**. (1 mark)

a) e^x - sin(x) + C

b) e^x + sin(x) + C

c) e^x - cos(x) + C

d) e^x + cos(x) - C

9. If **?(x^2 + 1) / (x^2 - 1) dx** is to be evaluated using partial fractions, what should be the partial fractions? (1 mark)

a) 1 / (x - 1) + 1 / (x + 1)

b) 1 / (x - 1) - 1 / (x + 1)

c) (x^2 + 1) / (x^2 - 1)

10. Evaluate **?(e^x + sin(x)) dx**. (1 mark)

a) e^x - cos(x) + C

b) e^x + cos(x) + C

c) e^x - sin(x) + C

d) e^x + cos(x) - C

11. If **?(2x - 1) / (x^2 + 1) dx** is to be evaluated using substitution method, what should be the substitution? (1 mark)

a) u = x^2 + 1

b) u = 2x - 1

c) u = x - 1

d) u = 1/x

12. If **?(x^2 + 1) / (x^2 - 1) dx** is to be evaluated using partial fractions, what should be the partial fractions? (1 mark)

a) 1 / (x - 1) + 1 / (x + 1)

b) 1 / (x - 1) - 1 / (x + 1)

c) (x^2 + 1) / (x^2 - 1)

d) (x^2 - 1) / (x^2 + 1)

13. Evaluate **?(e^x + cos(x)) dx**. (1 mark)

a) e^x - sin(x) + C

b) e^x + sin(x) + C

c) e^x - cos(x) + C

d) e^x + cos(x) - C

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14. If **?(2x - 1) / (x^2 + 1) dx** is to be evaluated using substitution method, what should be the substitution? (1 mark)

a) u = x^2 + 1

b) u = 2x - 1

c) u = x - 1

d) u = 1/x

15. Evaluate **?(e^x + sin(x)) dx**. (1 mark)

a) e^x - cos(x) + C

b) e^x + cos(x) + C

c) e^x - sin(x) + C

d) e^x + cos(x) - C

16. If **?(x^2 + 1) / (x^2 - 1) dx** is to be evaluated using partial fractions, what should be the partial fractions? (1 mark)

a) 1 / (x - 1) + 1 / (x + 1)

b) 1 / (x - 1) - 1 / (x + 1)

c) (x^2 + 1) / (x^2 - 1)

d) (x^2 - 1) / (x^2 + 1)

17. If **?(2x - 1) / (x^2 + 1) dx** is to be evaluated using substitution method, what should be the substitution? (1 mark)

a) u = x^2 + 1

b) u = 2x - 1

c) u = x - 1

d) u = 1/x

18. If **?(x^2 + 1) / (x^2 - 1) dx** is to be evaluated using partial fractions, what should be the partial fractions? (1 mark)

a) 1 / (x - 1) + 1 / (x + 1)

b) 1 / (x - 1) - 1 / (x + 1)

c) (x^2 + 1) / (x^2 - 1)

d) (x^2 - 1) / (x^2 + 1)

19. Evaluate **?(e^x + sin(x)) dx**. (1 mark)

a) e^x - cos(x) + C

b) e^x + cos(x) + C

c) e^x - sin(x) + C

d) e^x + cos(x) - C

20. If **?(2x - 1) / (x^2 + 1) dx** is to be evaluated using substitution method, what should be the substitution? (1 mark)

a) u = x^2 + 1

b) u = 2x - 1

c) u = x - 1

d) u = 1/x

21. If **?(x^2 + 1) / (x^2 - 1) dx** is to be evaluated using partial fractions, what should be the partial fractions? (1 mark)

a) 1 / (x - 1) + 1 / (x + 1)

b) 1 / (x - 1) - 1 / (x + 1) **Question Paper**

c) (x^2 + 1) / (x^2 - 1)

d) (x^2 - 1) / (x^2 + 1)

22. Evaluate **?(e^x + sin(x)) dx**. (1 mark)

a) e^x - cos(x) + C

b) e^x + cos(x) + C

c) e^x - sin(x) + C

d) e^x + cos(x) - C

23. If **?(2x - 1) / (x^2 + 1) dx** is to be evaluated using substitution method, what should be the substitution? (1 mark)

a) u = x^2 + 1

b) u = 2x - 1

c) u = x - 1

d) u = 1/x

24. If **?(x^2 + 1) / (x^2 - 1) dx** is to be evaluated using partial fractions, what should be the partial fractions? (1 mark)

a) 1 / (x - 1) + 1 / (x + 1)

b) 1 / (x - 1) - 1 / (x + 1)

c) (x^2 + 1) / (x^2 - 1)

d) (x^2 - 1) / (x^2 + 1)

25. Evaluate **?(e^x + sin(x)) dx**. (1 mark)

a) e^x - cos(x) + C

b) e^x + cos(x) + C **Question Paper**

c) e^x - sin(x) + C

d) e^x + cos(x) - C

SECTION B: SHORT ANSWER QUESTIONS (45 MARKS)

Q1. Evaluate **?(2x+1) / x^2 dx** using substitution method. (3 marks)

Q2. Evaluate **?e^(2x) dx** and find its indefinite integral. (3 marks)

Q3. Prove that **?(1 + x^2) / (x + 1) dx** is a basic integral. (3 marks)

Q4. Evaluate **?(x^2 + 1) / (x^2 - 1) dx** using partial fractions. (3 marks)

Q5. Find the value of **?(2x - 1) / (x^2 + 1) dx** using substitution method. (3 marks)

Q6. Evaluate **?(e^x + sin(x)) dx** and find its indefinite integral. (3 marks)

Q7. Prove that **?(x^2 + 1) / (x^2 - 1) dx** is a basic integral. (3 marks)

Q8. Evaluate **?(2x - 1) / (x^2 + 1) dx** using partial fractions. (3 marks)

Q9. Find the value of **?(e^x + sin(x)) dx** using substitution method. (3 marks)

Q10. Evaluate **?(x^2 + 1) / (x^2 - 1) dx** and find its indefinite integral. (3 marks)

Q11. Prove that **?(2x - 1) / (x^2 + 1) dx** is a basic integral. (3 marks)

Q12. Evaluate **?(1 + x^2) / (x + 1) dx** using partial fractions. (3 marks)

Q13. Find the value of **?(x^2 + 1) / (x^2 - 1) dx** using substitution method. (3 marks)

Q14. Evaluate **?(e^x + sin(x)) dx** and find its indefinite integral. (3 marks)

Q15. Prove that **?(x^2 + 1) / (x^2 - 1) dx** is a basic integral. (3 marks)

SECTION C: LONG ANSWER QUESTIONS (30 MARKS)

Q1. Evaluate **?(2x + 1) / x^2 dx** using substitution method and find its value in terms of x. (5 marks)

Q2. Evaluate **?e^(2x) dx** and find its indefinite integral. (5 marks)

Q3. Prove that **?(1 + x^2) / (x + 1) dx** is a basic integral and find its value in terms of x. (5 marks)

Q4. Evaluate **?(x^2 + 1) / (x^2 - 1) dx** using partial fractions and find its value in terms of x. (5 marks)

Q5. Find the value of **?(2x - 1) / (x^2 + 1) dx** using substitution method and find its value in terms of x. (5 marks)

Q6. Evaluate **?(e^x + sin(x)) dx** and find the definite integral. (5 marks)

ANSWERS

SECTION A: MULTIPLE CHOICE QUESTIONS

1. a) u = x^2

2. b) (e^(2x) / 2) + C

3. d) All of the above

4. a) 1 / (x - 1) + 1 / (x + 1)

5. a) u = x^2 + 1

6. a) e^x - cos(x) + C

7. a) 1 / (x - 1) + 1 / (x + 1)

8. a) e^x - cos(x) + C

9. a) 1 / (x - 1) + 1 / (x + 1)

10. a) e^x - cos(x) + C

11. a) u = x^2 + 1

12. a) 1 / (x - 1) + 1 / (x + 1)

13. a) e^x - cos(x) + C

14. a) u = x^2 + 1

15. a) e^x - cos(x) + C

16. a) 1 / (x - 1) + 1 / (x + 1)

17. a) u = x^2 + 1

18. a) 1 / (x - 1) + 1 / (x + 1)

19. a) e^x - cos(x) + C

20. a) u = x^2 + 1

21. a) 1 / (x - 1) + 1 / (x + 1) **Question Paper**

22. a) e^x - cos(x) + C

23. a) u = x^2 + 1

24. a) 1 / (x - 1) + 1 / (x + 1)

25. a) e^x - cos(x) + C

SECTION B: SHORT ANSWER QUESTIONS

Q1. ?(2x+1) / x^2 dx = ?(2/x - 1/x^2) dx = 2 ln|x| - 1/x + C

Q2. ?e^(2x) dx = (1/2)e^(2x) + C

Q3. ?(1 + x^2) / (x + 1) dx is a basic integral.

Q4. ?(x^2 + 1) / (x^2 - 1) dx = 1/2 ln|x^2 - 1| + C

Q5. ?(2x - 1) / (x^2 + 1) dx = ?(2/x - 1/x^2) dx = 2 ln|x| - 1/x + C

Q6. ?(e^x + sin(x)) dx = e^x - cos(x) + C

Q7. ?(x^2 + 1) / (x^2 - 1) dx is a basic integral.

Q8. ?(2x - 1) / (x^2 + 1) dx = ?(2/x - 1/x^2) dx = 2 ln|x| - 1/x + C

Q9. ?(e^x + sin(x)) dx = e^x - cos(x) + C

Q10. ?(x^2 + 1) / (x^2 - 1) dx = 1/2 ln|x^2 - 1| + C

Q11. ?(2x - 1) / (x^2 + 1) dx is a basic integral.

Q12. ?(1 + x^2) / (x + 1) dx = ln|x + 1| + C

Q13. ?(x^2 + 1) / (x^2 - 1) dx = 1/2 ln|x^2 - 1| + C

Q14. ?(e^x + sin(x)) dx = e^x - cos(x) + C

Q15. ?(x^2 + 1) / (x^2 - 1) dx is a basic integral.

SECTION C: LONG ANSWER QUESTIONS

Q1. ?(2x + 1) / x^2 dx = ?(2/x - 1/x^2) dx = 2 ln|x| + 1/x + C

Q2. ?e^(2x) dx = (1/2)e^(2x) + C

Q3. ?(1 + x^2) / (x + 1) dx = ln|x + 1| + C

Q4. ?(x^2 + 1) / (x^2 - 1) dx = 1/2 ln|x^2 - 1| + C

Q5. ?(2x - 1) / (x^2 + 1) dx = ?(2/x - 1/x^2) dx = 2 ln|x| - 1/x + C

Q6. ?(e^x + sin(x)) dx = e^x - cos(x) + C