KVS BHOPAL REGION CBT TEST SEPT 2023
SUBJECT-MATHEMATICS
CLASS-12

TOPICS: INTEGRALS
APPLICATIONS OF THE INTEGRALS

Case Study – 1

Mathematics teacher Mrs Kalpna completed integrals chapter in class XII and made announcement for class test of integrals in next week. On the day of test, she divided the students in four groups.

She gave a question as a challenge to each group. Group wise, following questions were given.

Group 1: $Evaluate \int \frac{1}{1+\tan x} dx$

Group 2: $Evaluate \int \frac{e^x(1+x)}{cos^2(e^x x)} dx$

Group 3: $Evaluate \int \log x \ dx$

Group 4 $Evaluate \int_{-1}^{2} |x^3 - x| dx$

Allotted time for each group was 10 minutes. After 10 minutes each group submitted their solutions. Following Summary of their solutions was found.

Group 1: Answer $\frac{x}{2} + log|\cos x + \sin x| + c$ (Incorrect answer)

Group 2: The answer of group 2 was correct.

Group 3: Group 3 wrote integration by part formula in solution but students were not able to recognize first function.

Group 4: students used definite integral property and found answer 11/4.

Read the above situation carefully and answer the following questions:

Q1 The correct answer of group 1 is like: $\frac{x}{2} + k\ log|\cos x + \sin x| + c$. To make the answer correct, the value of k will be

(A) 2 (B) 1/2 (C) -2 (D) -1/2

Q2. The correct answer of group 2 will be

(A) $-\cot(x\, e^x) + c$ (B) $\cot(xe^x) + c$

(C) $-\tan(x\,e^x)+c$ (D) $\tan(xe^x)+c$

Q3. As per the answer summary of Group 3 select the correct option

(A) Method is correct and first function is 1. (B) Method is correct and first function is log x.

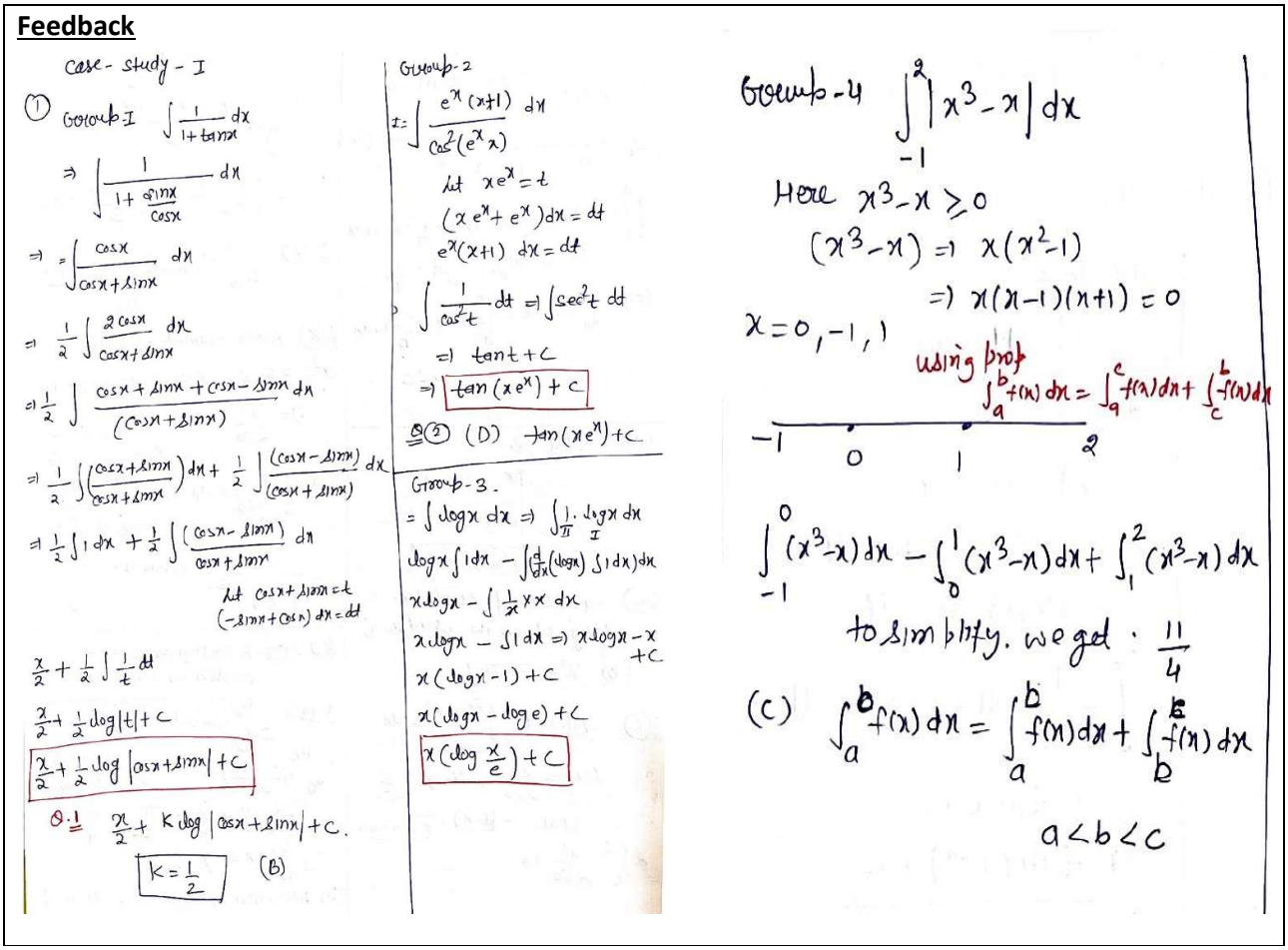
(C) Method is wrong. (D) None of these

Q4. To solve the question of group 4, select the correct property

(A) $\int_{-a}^{a} f(x)dx = 2\int_{0}^{a} f(x)dx$ (B) $\int_{a}^{b} f(x)dx = 2\int_{a}^{b} f(a+b-x)dx$

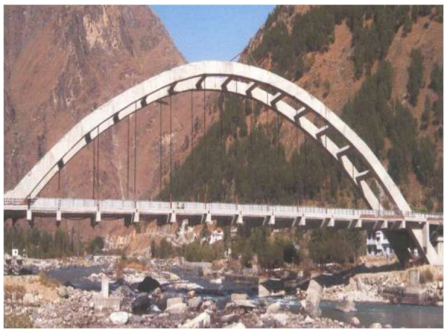
(C) $\int_{a}^{c} f(x)dx = \int_{a}^{b} f(x)dx + \int_{b}^{c} f(x)dx\,, a<b<c$ (D) None of these

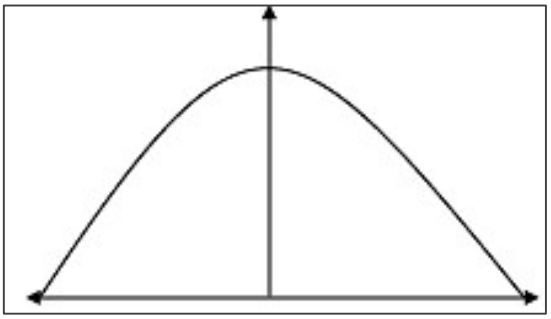
Feedback



Case Study – 2

Read the following text and answer the following questions on the basis of same:





The bridge connects two hills 100 feet apart. The arch on the bridge is in a parabolic form. The highest point on the bridge is 10 feet above the road at the middle of the bridge as shown in the figure.

Q 5. The equation of the parabola designed on the bridge is

(A) $x^2 = 250y$ (B) $x^2 = -250y$

(C) $y^2 = 250x$ (D) $y^2 = 250y$

Q 6. The value of the integral $\int_{-50}^{50} \frac{x^2}{250}\,dx$ is

(A) $\frac{1000}{3}$ (B) $\frac{250}{3}$

(C) 1200 (D) 0

Q 7. The integrand of the integral $\int_{-50}^{50} x^2\,dx$ is ---------- function.

(A) Even (B) Odd

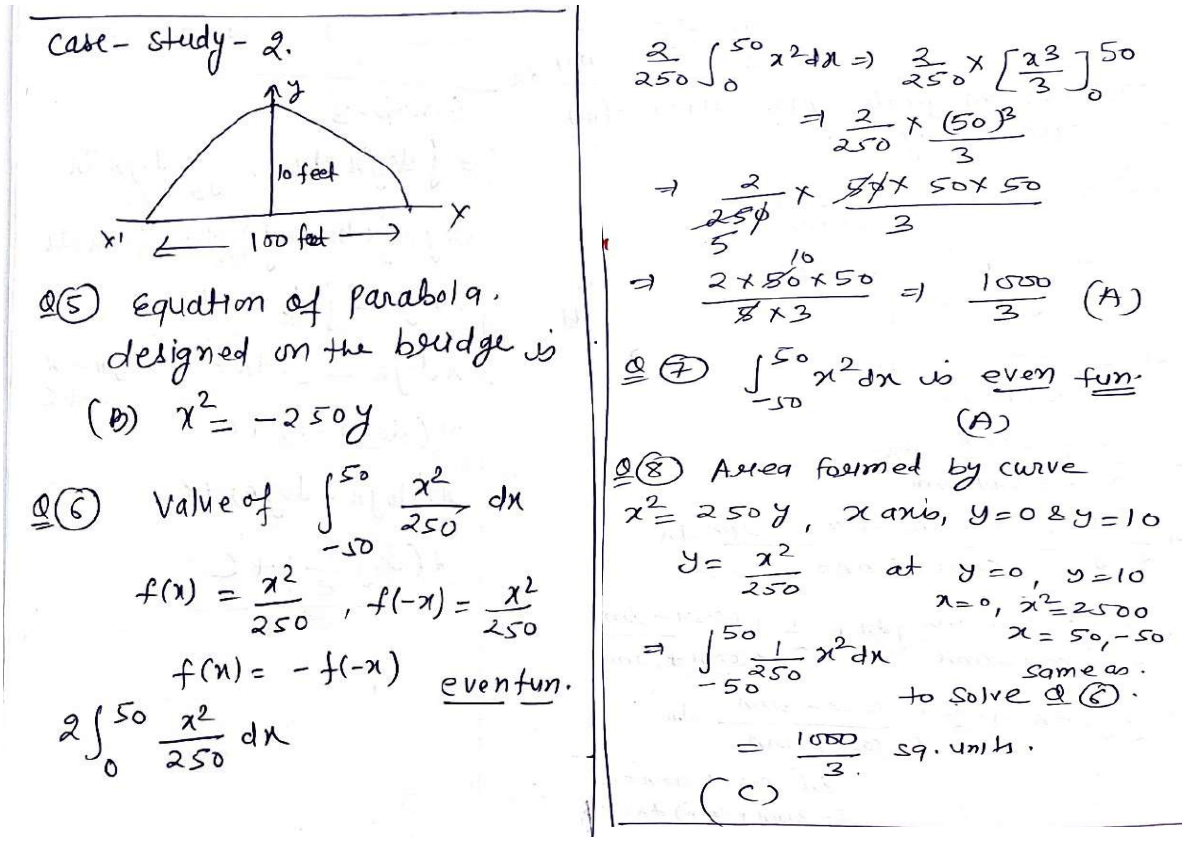
(C) Neither odd nor even (D) None of these

Q 8. The area formed by the curve $x^2 = 250y$, X-axis, $y = 0$ and $y = 10$ is

(A) $\frac{1000\sqrt{2}}{3}$ (B) $\frac{4}{3}$

(C) $\frac{1000}{3}$ (D) 0

Feedback



ASSERTION - REASON TYPE QUESTIONS :

Directions: Each of these questions contains two statements, Assertion and Reason. Each of these questions also has four alternative choices, only one of which is the correct answer. You have to select one of the codes (a), (b), (c) and (d) given below.

(a) Assertion is correct, Reason is correct; Reason is a correct explanation for assertion.
(b) Assertion is correct, Reason is correct; Reason is not a correct explanation for Assertion
(c) Assertion is correct, Reason is incorrect
(d) Assertion is incorrect, Reason is correct

Q9. Assertion: The area bounded by the circle $x^2 + y^2 = a^2$ in the first quadrant is given by $\int_0^a \sqrt{a^2 - x^2}\, dx$

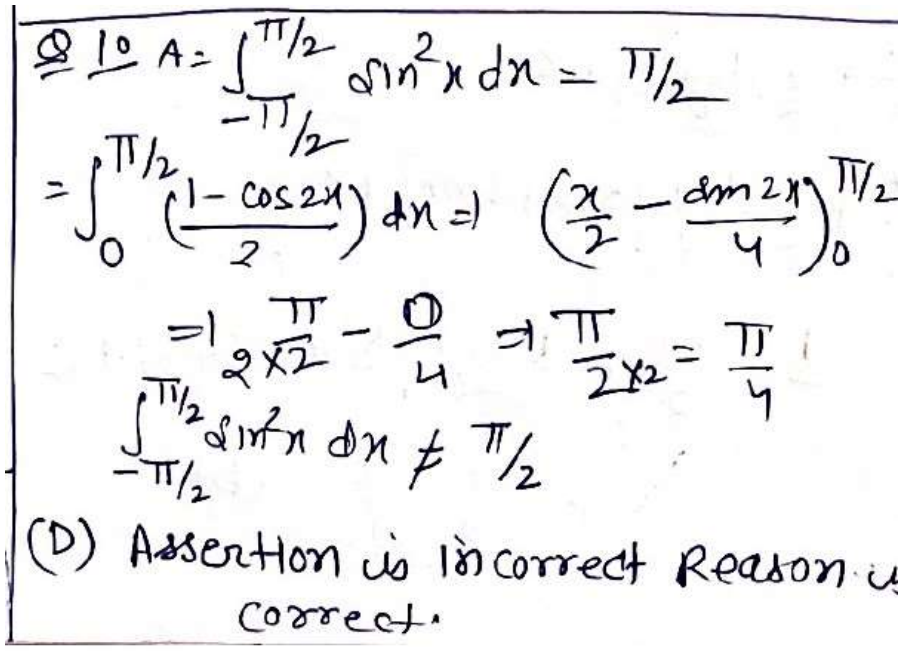
Reason : The same area can also be found by $\int_0^a \sqrt{a^2 - y^2}\, dy$

Feedback
Assertion is correct, Reason is incorrect.

Q10. Assertion (A) : $\int_{-\pi/2}^{\pi/2} sin^2 x\, dx = \frac{\pi}{2}$

Reason (R) : If f(x) is an odd function, then $\int_{-a}^{a} f(x)dx = 2\int_0^a f(x)dx$

Feedback



Answer Key

Case Study 1	Q1. B	Q2. D	Q3. A	Q4. C
Case Study 2	Q5. B	Q6. A	Q7. A	Q8. C
Q9. C	Q10. D			