



**HADHRAMOUT UNIVERSITY**  
**COLLEGE OF ENGINEERING & PETROLEUM**



**Department:** All  
**Academic Year:** 2020 – 2021  
**Exam Semester:** Second  
**Examiner:** Salman Ba-Rashed & Mohammed Saleh Bafgeh

**Date:** 14 / 8 / 2021  
**Subject:** Integral Calculus  
**Level:** The first Level  
**Time Allowed:** 2:30 Minutes

**Answer all the following questions**

**Question 1: (25 marks) (12 +13)**

(a) Choose the correct answer in the following

1 – If  $\int_0^2 g(x) dx = 4$ , then  $\int_2^0 g(x) dx =$

- a) Zero ,                      b) 4 ,                      c) - 4 ,                      d) non of the above

2 –  $\int \frac{x}{4 - 9x^2} dx =$

- a)  $-\frac{1}{18} \ln|4 - 9x^2| + c$  ,    b)  $-18 \ln|4 - 9x^2| + c$  ,    c)  $\ln|4 - 9x^2| + c$  ,    d)  $\frac{1}{6} \tanh^{-1}(\frac{3}{2}x^2) + c$

3 – The upper bound of  $\int_1^4 -2f(x)dx$  if  $9 \leq -3f(x) \leq 18$  is

- a) - 18 ,                      b) - 9 ,                      c) 36 ,                      d) 54

4 – If  $\int_6^{b+1} (2x + 7) dx = \text{zero}$  , then  $b =$

- a) - 1 ,                      b) zero ,                      c) 6 ,                      d) 5

(b) Evaluate the following

1)  $\int (6x^2 + 2x - 7) dx$                       2)  $\int_0^\pi \frac{\sin x}{(3 + \cos x)^2} dx$

**Question 2: (25 marks) (8 + 8 +9)**

(a) Stat true or foulds :

1.  $\int (-3x + 1)^4 dx = \frac{(-3x+1)^5}{-12} + c$  ( )

2.  $\tanh(-2x) = \frac{e^{-2x} - e^{2x}}{e^{2x} + e^{-2x}}$  ( )

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

4.  $\sum_{i=1}^7 i^2 = 28$  ( )

(b) without evaluting the integral show that  $\int_1^2 \cos(\frac{\pi}{2}x) \leq 0$

(c) Use the **Definition of definite integral** to find  $\int_0^3 (x^2 - 4x) dx$

**Question 3: (30 marks )(10+20)**

(a) Find the number  $C$  that satisfies the mean value theorem for the following integral

$$\int_1^3 (x - 20)^3 dx$$

(b) Evaluate the following integrals ( chose two branches )

$$1) \int \frac{x^2 + 10x + 6}{x^2 + 2x - 8} dx \quad 2) \int \frac{1}{4x^2 - 9} dx \quad 2) \int x \sinh 5x dx$$

**Question 4: (20 marks )(5+15)**

(a) Solve the following initial value problem

$$f'(x) = 6x^2 + x - 5 \quad \text{s.t. } f(1) = 2$$

(b) Evaluate the following integrals

$$1) \int \sqrt{x} 2^{\sqrt[3]{x}} dx \quad 2) \int \frac{2x + 5}{x^2 + 4x + 9} dx$$

*Good luck*