

KABARAK



UNIVERSITY

UNIVERSITY EXAMINATIONS

2013/2014 ACADEMIC YEAR

FOR THE DEGREE OF BACHELOR OF EDUCATION SCIENCE

MATH 121: CALCULUS 11

DAY: FRIDAY

DATE: 18/04/2014

TIME: 10.00 - 1.00 P.M.

STREAM: Y1S1

INSTRUCTIONS:

- Answer question **ONE** and any other **TWO**

QUESTION ONE (30MKS)

- a) (i) A curve passes through the point (3,-2) and its gradient function is $2x+5$. Find its equation (3Mks)
- (ii) Evaluate $\int \frac{x^2}{1-4x^2} dx$ (3Mks)
- b) i. Prove that $\int \tan x dx = \ln|\sec x| + c$ (4Mks)
- ii. Evaluate $\int_0^2 \frac{1}{x^{\frac{3}{2}}} dx$ (2Mks)
- c) (i) Use integration by parts to evaluate $\int x^2 e^x dx$ (4Mks)
- (ii) Evaluate $\int \log x dx$ (2Mks)
- d) (i) Find $\int \frac{-2x}{(x+1)(x^2+1)} dx$ (3Mks)
- (ii) Evaluate $\int \frac{e^{\sqrt{x}}}{\sqrt{x}} dx$ (3Mks)
- e) (i) Evaluate $\int \frac{1}{\sqrt{a^2 - b^2 x^2}} dx$ (3Mks)

(ii) Evaluate $\int \frac{e^x + e^{-x}}{e^x - e^{-x}} dx$ (3Mks)

QUESTION TWO (20MARKS)

a) (i) Evaluate $\int \frac{x^2}{5+x^2} dx$ (3Mks)

(ii) Evaluate the definite integral

$$\int_1^5 \frac{x}{\sqrt{2x-1}} dx \quad (4Mks)$$

b) A curve has equation $8y = -\frac{2}{x} - x^4$ show that $\sqrt{1 + \left(\frac{dy}{dx}\right)^2} = \frac{1}{2}\left(\frac{1}{x^3} + x^3\right)$ Hence find

the length of the curve from $x=1$ to $x=4$ (7Mks)

c) Evaluate $\int \cos^2 x \sin x dx$ (3Mks)

d) Evaluate $\frac{\sec^2 x}{1 - \tan x} dx$ (3Mks)

QUESTION THREE (20MARKS)

a) Estimate the area under the curve $y = \frac{2x}{2x^2+1}$ between $x=0$ and $x=1$ using $n=6$ by

i. Trapezoidal rule

ii. Simpson's rule (10Mks)

b) Integrate $\int \cos^2 x dx$ (4Mks)

c) Integrate by parts $\int x^2 \ln x dx$ (6Mks)

QUESTION FOUR (20MARKS)

a) Evaluate $\int e^{2x} \sin x dx$ (5Mks)

b) Find the area of the surface generated by revolving about x-axis the arc of the curve $y = x^{\frac{2}{3}}$

on (0,1) (5Mks)

c) Find the volume of the solid generated revolving about x- axis the region bounded by

$$y = \sqrt{x} \text{ and } y = x \quad (6Mks)$$

d) Evaluate $\int \frac{x^2}{x^3 - 3x^2 - 3x + 27} dx$ (4Mks)

QUESTION FIVE (20MARKS)

a) Find the length of the curve $y = \frac{1}{8}x^4 + \frac{1}{4x^2}$ from $x=1$ to $x=2$ (6mks)

b) Find the area of the region bounded by the curves $y=x^2$ and $y=-x^2 + 6x$ (6Mks)

c) Resolve $\frac{2x^3 + x^2 - 6x + 7}{x^2 + x - 6}$ into partial fractions hence evaluate its integral (4Mks)

d) Find the surface area of revolution of a parallel $y^2=x$ from $(1,1)$ to $(4,2)$ about the x - axis (4Mks)