



Branch: Material Science

Subject: Math

Examiner: Dr. Mofeed Abdul-Lateef

Final Examination

2015 -2016

Class : 1st year

Time : 3 hours

Date : 22/5/2016

NOTE: answer four question only

Q1 (A) Vectors are drawn from the origin point (O) to the point $A(1, -2, -2)$ and $B(6, 3, -2)$, find: (15marks)

(1) the angle AOB ; (2) the unit vector to both \vec{A} and \vec{B}

(B) A particle along the curve $x^2y^3 = 27$, at the time when the particle at point $(1, 3)$, $\frac{dy}{dt} = 10$; find the value of velocity $\frac{dx}{dt}$ at this time? (10 marks)

Q2 (A) Find the limit for the following: (15marks)

(1) $\lim_{x \rightarrow 3^+} \left(\frac{x^2 - 9}{|x - 3|} \right)$ (2) $\lim_{x \rightarrow \frac{\pi}{4}} (1 - \tan x) \sec 2x$

(3) $\lim_{x \rightarrow 0^+} (x + \sin x)^{1/x}$

(B) Find the volume of the region bonded by curves $y = x^2$ and $y = 8 - x^2$ that is rotated about y -axis? (10 marks)

Q3 (A) Find $\frac{dy}{dx}$ for the following (15marks)

(1) $y = \coth(\tan^{-1} e^{3x})$ (2) $y = x^{\sqrt{x^2 + e^x}}$ (3) $y = 4^{\sin x^2}$

(B) Find the area of the surface obtained by revolving the curve $y = \sqrt{x}$ over $(0 \leq x \leq 2)$ about the x -axis (10 marks)

Q4 (A) Evaluate the following integration: (15marks)

(1) $\int \frac{dx}{\sqrt{4x^2 + 1}}$ (2) $\int \cos(\ln x) dx$ (3) $\int \frac{dx}{\sqrt{9 + 16x + 4x^2}}$

(B) Find (b) such that (10 marks)

$f(x) = \begin{cases} \frac{x^3 + 2x^2}{x^2} & \text{if } x \neq 0 \\ b & \text{if } x = 0 \end{cases}$ Is continuous

To Be Continua



Q5(A) Solve the system of equation by one of the matrix methods (10 marks)

$$\sin 3x - \sinhy + \log_{10} z = 0 \dots \dots \dots (1)$$

$$2\sin 3x + (e^{-y} - e^y) + \log_{10} z = -1 \dots \dots \dots (2)$$

$$\cos\left(\frac{\pi}{2} - 3x\right) + 3 \log_{10} z + \sinhy - 2 = 0 \dots \dots \dots (3)$$

(B) (1) solve the differential equation with initial condition (10 marks)

$$\frac{d^3y}{dx^3} = 6, \quad x = 0, \quad y = 5, \quad \frac{dy}{dx} = 0, \quad \frac{d^2y}{dx^2} = -8$$

(c) Find domain and range for (1) $y = \sin x$

(2) $y = \cos x$

(5 marks)