TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

KIBIT EXAMINATIONS FOR:

HIGHER DIPLOMA IN BUILDING AND CIVIL ENGINEERING

(BUILDING ECONOMICS OPTION)

EBC 3201: MATHEMATICS III

YEAR 2 SEMESTER I

SERIES: DECEMBER 2017

TIME: 2 HOURS

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

-Pocket calculator

This paper consists of **FIVE** questions. Attempt any **THREE** questions.

Do not write on the question paper.

Mobile Phones are NOT allowed inside the examination room.

QUESTION ONE

(a) Determine area bounded by the function $y = 12 - x^2$ and the x-axis. (7marks)

(b) Solve the equation $(2+x^2)\frac{dy}{dx} = 2+y^2$ if the equation passes through point (1, 5).

(4 Marks)

(b) The area bounded by the function $y = x^2 - 3$ and x-axis is to be rotated about x-axis through 1 revolution. Find the volume for the solid to be generated.

(9 Marks)

QUESTION TWO

(a) Solve the following equation:

$$(x+y)\frac{dy}{dx} = x + \frac{y^2}{x}$$

(8 Marks)

(b) Find the equation of the curve which passes through (1,2) and satisfies the following equation:

$$2xy\frac{dy}{dx} = x^2 + 1$$

(5 Marks)

(c) Determine the particular solution for the following equation:

$$\frac{dy}{dx} - \frac{y}{x-2} = (x-2)^2 \quad \text{given } y = 8 \text{ when } x = 2$$

(7 Marks)

QUESTION THREE

(a) Determine area bounded by the functions $y = x^3$ and $y = 2$

(8 marks)

(b) An area is bounded by the curve $y = \text{Cos}^2 x$, and lines $y = 0$, and $x = \pi/4$

　(i) Calculate the area

　(ii) Find volume for the solid of revolution to be generated if the area is rotated about x-axis through

　　revolution.

(12 marks)

QUESTION FOUR

(a) Solve the equation;

$$\frac{d^2y}{dx^2} + 2\frac{dy}{dx} - 6y = 3 \qquad\qquad \text{(7marks)}$$

(b) The motion of a vibrating body is defined by the following differential equation:

$$\frac{d^2x}{dt^2} + 3\frac{dx}{dt} = 5 \quad \text{where x is the displacement in meters.}$$

Solve the equation given that t = 0, x = 0 and $\frac{dx}{dt} = 0$ and hence determine the velocity for the body at time t = 4seconds.

(13 Marks)

QUESTION FIVE

(a) Determine area bounded by the functions $y = 4x^2 + 1$ and $y = 1$ (10 Marks)

(b) Figure 1 shows a T section of a beam. Use the section to determine the following:

(i) Second moment of area about xx' axis.
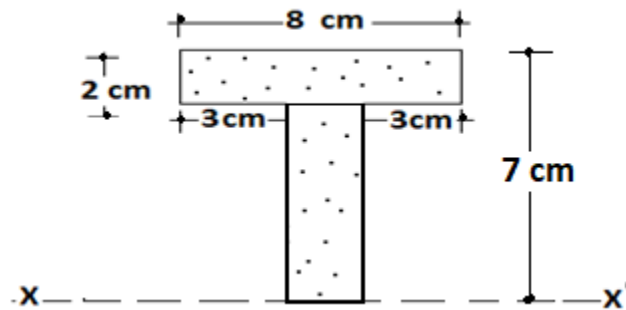
(ii) Radius of gyration. (10 marks)

Fig.1