



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 functions $y = 4x^2 + 2$ and $y = 6$ (10 Marks)

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

(10 Marks)

QUESTION TWO

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

$$2xy \frac{dy}{dx} = x^2 + 1 \quad (4 \text{ Marks})$$

(b) Solve the following equation:

$$(x+y) \frac{dy}{dx} = x + \frac{y^2}{x} \quad (9 \text{ Marks})$$

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

$$\frac{dy}{dx} - \frac{y}{x-2} = (x-2)^2 \quad \text{given } y = 10 \text{ when } x = 4 \quad (7 \text{ Marks})$$

QUESTION THREE

(a) Determine area bounded by the functions $y = x^2$ and $y = 3$ (8 marks)

(b) An area is bounded by the curve $y = \sin^2 x$, 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) Determine area bounded by the function $y = 4 - x^2$ and the x-axis.

(7marks)

(b) Solve the equation $(1+x^2) \frac{dy}{dx} = 1+y^2$ if the equation passes through point (2, 3).

(4 Marks)

(c) Figure 1 shows an I section of a beam. Use the section to determine the following:

(i) Second moment of area about xx' axis

(ii) Radius of gyration

(9 marks)

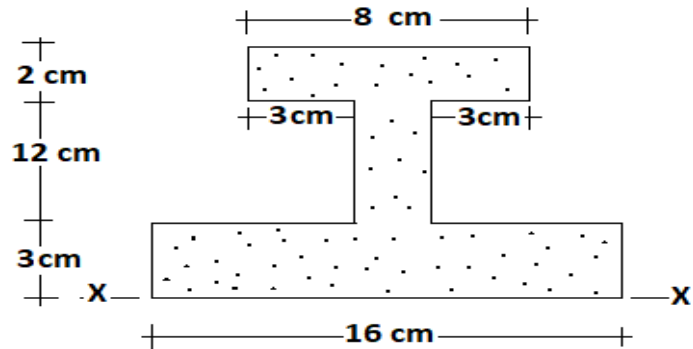


Fig.1

QUESTION FIVE

(a) Solve the equation;

$$\frac{d^2y}{dx^2} + 2\frac{dy}{dx} - 8y = 2 \quad (7\text{marks})$$

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

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

Solve the equation given that $t = 0, x = 0$ and $\frac{dx}{dt} = 0$ and hence determine the velocity for the body at time $t = 2\text{sec}$.

(13 Marks)