

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DIPLOMA IN COMPUTER SCIENCE

COSC 0170: MATHEMATICS FOR COMPUTING I

STREAMS: COSC

TIME: 2 HOURS

DAY/DATE: WEDNESDAY06/12/2017

2.30 P.M. – 4.30 P.M.

INSTRUCTIONS: ANSWER ALL QUESTIONS

QUESTION ONE (30 MARKS)

- (a) Discuss the following properties of real numbers
- (i) Commutative
 - (ii) Associative
 - (iii) Distributive [3 marks]
- (b) Simplify $\frac{8-6i}{3-4i}$ [3 marks]
- (c) Given $2y-3x=5$, find the gradient and y- intercept of the line. [3 marks]
- (d) Solve $6x^2 + 2x - 8 = 0$ using factorization method. [4 marks]
- (e) (i) How many arrangement are there of the letters of the word BUILDING.[2 marks]
(ii) A committee of 5 men and 4 women is to be chosen from 8 men and 6 women.
How many ways can this be done? [5 marks]
- (f) Given that
- $$\mathcal{E} = \{0, 2, 4, 6, 8, 10, 12\}$$
- $$C = \{4, 8\}$$
- $$D = \{0, 2, 10\}$$
- $$E = \{0, 2, 10, 12\}$$
- Find
- (i) C^c
 - (ii) D^c

(iii) E^c

(iv) EnD

(v) $CnDnE$

[5 marks]

(g) Solve the following simultaneous equations using substitution method.

$$2x - y = 6$$

$$6x - 4y = 4$$

[5 marks]

QUESTION TWO (20 MARKS)

(a) The coordinates of the end points of the diameter of a circle are $A(-3, 8)$ and $B(1, 5)$.

Find

(i) The centre of the circle

(ii) Radius

(iii) Equation of the circle

[10 marks]

(b) The formula for converting $^{\circ}\text{C}$ to $^{\circ}\text{F}$ temperature is $F = \frac{9}{2}C + 32$. What celcius temperature range correspond to the range $32 < F < 77$?

[5 marks]

(c) Solve $2x + 3 < 5$ or $4x - 7 < 9$. Graph the solution.

[5 marks]

QUESTION THREE (20 MARKS)

(a) Construct a truth table to verify if the statements $np \rightarrow q$ and $np \rightarrow nq$ are equivalent

[8 marks]

(b) Show that $\frac{1+\cos\theta}{\sin\theta} = \frac{\sin\theta}{1-\cos\theta}$

[5 marks]

(c) Given $g(x) = -7x + 2x^2$

$$h(x) = 3x^3 + 6x^2 + 7$$

Find:

(i) $g(x) + h(x)$

(ii) $g(2)$

(iii) $g(1) - h(-1)$

(iv) $2g(x) - h(x)$

[5 marks]

(d) Solve for n in ${}^nC_2 = 28$

[5 marks]

QUESTION FOUR (20 MARKS)

(a) Given $h(x) = \begin{cases} x + 3 & \text{if } x \leq 2 \\ 5 & \text{if } x < 6 \\ x^2 + 1 & \text{if } x \geq 6 \end{cases}$

Find:

(i) $h(1)$

(ii) $h(10)$

(iii) $h(4)$

(iv) $h(-3)$

(v) $h(5)$

(b) Find the quotient and the remainder in $3x^3 + x^2 - 13x + 16 \div x - 2$ [5 marks]

(c) Given $f(x) = 2x + 3$

$g(x) = -x^2 + 5$

Find

(i) $f \circ g(x)$

(ii) $g \circ f(x)$

(iii) $f \circ f(x)$

(iv) $g \circ g(x)$ [5 marks]

(d) Solve the equation $2\sin^2 x = \sin x$ for $0^\circ \leq x \leq 360^\circ$ [5 marks]

QUESTION FIVE

(a) Find $\frac{dy}{dx}$ using method of choice or indicated technique in the bracket

(i) $y = \frac{1}{x^2} + \sqrt{x}$ [3 marks]

(ii) $y = (5x^2 + 2)(x^3 - 3)$ (*product rule*) [3 marks]

(iii) $y = \frac{x^2 + 4x}{2x - 1}$ (*quotient rule*) [3 marks]

(iv) $y = (6x^4 - 1)^2$ (*chain rule*) [3 marks]

(b) Find the equation of the line passing through the points (1, 3) and (4, 9) [5 marks]

(c) Solve $3p - 2q = 0$ Using elimination method. [3 marks]

$4p + q = 1$