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OFFICE OF THE DEPUTY PRINCIPAL

ACADEMICS, STUDENT AFFAIRS AND RESEARCH

UNIVERSITY EXAMINATIONS

2018 /2019 ACADEMIC YEAR

FIRST YEAR FIRST SEMESTER REGULAR EXAMINATION

FOR THE DEGREE OF BACHELOR OF SCIENCE (COMPUTER SCIENCE)

COURSE CODE: **MAT 104**

COURSE TITLE: **BASIC MATHEMATICS AND ANALYTIC GEOMETRY**

DATE: 11TH DECEMBER, 2018 **TIME: 2.00 PM – 5.00 PM**

INSTRUCTION TO CANDIDATES

- **SEE INSIDE**

THIS PAPER CONSISTS OF 3 PRINTED PAGES **PLEASE TURN OVER**

MAT 104: BASIC MATHEMATICS AND ANALYTIC GEOMETRY

STREAM: BSc (Computer Science) **DURATION: 3 Hours**

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INSTRUCTION TO CANDIDATES

*Answer **ALL** questions from section A and **ANYTHREE** Questions in section B.*
All questions in section B carry Equal Marks
Duration of the examination: 3 hours

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SECTION A (31 MARKS)

Question One (16 MARKS

a) Define the following terms
 i. Conic (1mk)
 ii. Combination (1mk)

b) solve the equation $sin\vartheta = -\frac{1}{2}$ for values from $-180°$ to $180°$ (2mks)

c) Using an appropriate triangle show that $cos^2x + sin^2x = 1$ (3mks)

d) State and proof the t- formula for $sinx$ (3mks)

e) Change the equation $r^2 = a^2 cos\ 2\theta$ into Cartesian coordinates (2mks)

f) Convert the following polar coordinates to the Cartesian system $(2, 120^0)$ (2mks)

g) Show that the circles $x^2 + y^2 - 6x + 4y + 2 = 0$ and $x^2 + y^2 + 8x + 2y - 22 = 0$ are orthogonal (2mks)

Qestion Two (15 MARKS)

a) Find the tangents common to $x^2 + y^2 = 8$ and $y^2 = 16x$ (4mks)

b) Show that $Tan(A + B) = \frac{tanA+tanB}{1-tanAtanB}$ (3mks)

c) A committee of 6 is to be formed from a group of seven engineers and four mathematicians. How many different committees can be formed if at most 3 mathematicians are always to be included (3mks)

d) State and proof the cosine rule (3mks)

e) If $y = sh^{-1}(\frac{3}{4})$ show that $shy + chy = 2$ (2mks)

SECTION B

Question Three (13 MARKS)

a) Solve the following quadratic equation by factorization method $2x^2 + 3x+1 = 0$ (4mks)

b) Find the equation of hyperbola whose vertices are $(\pm6,0)$ and one of the direction is x=4

(3mks)

c) Show that $shAchB + chAshB = sh(A + B)$(3mks)

d) Solve $3cos\vartheta + 4sin\vartheta = 2$ for values of ϑ from $0°$ to $180°$ (3mks)

Question Four (13MARKS)

a) State the vertex and focus of the parabola having the equation; $(y-3)^2 = 8(x-5)$ (4mks)

b) Prove from the definition that $4sh^3x = sh3x - 3shx$(4mks)

c) Prove that $y = 2x + 2$ touches $y^2 = 16x$ (5mks)

Question Five (13MARKS)

a) Find the distance from the point (1,4) to the line $3x - 5y + 2 = 0$ (3mks)

b) Obtain the acute angle between $x - y + 1 = 0$ and $x + 5y + 1 = 0$ (3mks)

c) Find the vertex, focus, axis and directrix of the following parabola(3mks)

$$x^2 - 4x - 8y + 28 = 0$$

d) Solve the equation $3cos2\vartheta + sin\vartheta = 1$for values of $\vartheta$from 0° to 180° (4mks)

Question Six (13MARKS)

a) Using the remainder theorem factorize the expression $2x^3 + 3x^2 - 32x + 15$ (3mks)

b) Find the equation of a circle through points (1,5) (-2,3) (2,-1) (6mks)

c) Consider a curve $y = x^2 + 2x + 6$ find the equation of the tangent at x = 0 and the normal line (4mks)

Question Seven (13MARKS)

a) Divide $x^2 + 2x + 6$ by $x + 1$ (4mks)

b) In triangle PQR, r=5.75 and the sizes of angle P and Q are 42° and 65° respectively calculate the lengths of the remaining sides (3mks)

c) Using the standard formula of a circle show the gradient at the point where tangent meets the circle is $-(\frac{x_1+g}{y_1+f})$ (4mks)

d) Calculate the length of the tangent from the point (10,3) to the circle

$$2x^2 + 2y^2 - 4x + 8y - 2 = 0$$ (2mks)

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