Kiringaga University

UNIVERSITY EXAMINATION 2020/2021

YEAR I SEMESTER I EXAMINATION FOR THE DEGREE OF

BMC/BST/BAS/BIT/BCS/BBIT/BFS/BCH

SPM 2104: Mathematics for Science Year I Semester I

Date: 2022 Time: 1.30pm – 3.30pm

INSTRUCTIONS

Answer question One (Compulsory) and any other Two questions.

Question One (30mks)

a) Simplify

(i) $\frac{3-2\sqrt{5}}{2+\sqrt{5}} + \frac{4+3\sqrt{5}}{2-\sqrt{5}}$ (3mks)

(ii) $(5-1)^2 \times 5^4 \times (5^2)^{-2}$ (2mks)

b) Solve $log125 = \frac{3}{2}$ (2mks)

c) The sample weekly output in units of a manufacturing company has been recorded over10 weeks. The data values are; 19 22 20 16 24 24 16 20 24 23. Calculate;

(i) Mode. (1mk)

(ii) Median. (1 mk)

(iii)Mean. (I mk)

(iv) Variance. (2mks)

d) Write down the simplest expansion of $(1+ x)^6$. Hence use the expansion up to the fourth terms to find the value of $(1.03)^6$ to the nearest on thousandth. (4mks)

(e) A cubic polynomial $ax^3 + bx + 6$ is divisible by $x + 2$. When it is divided by $x - 1$ it leaves a remainder -3. Find the values of a and b. (4mks)

(f) A committee of 3 boys and 5 girls is to be chosen from 5 boys and 8 girls. In how many ways can this be done? (3mks)

(g) A box A contains 3 reds and 4 green beads and a box B contains 2 red and 5 green beads. Akinyi selects a box and then picks a bead from the box at random. She is twice as likely to choose box B as box A. What is the probability that she selects a green bead? (3mks)

(h) In triangle XYZ, x=5.6cm, y=7.8cm and $Z = 54^0$. Find z and X. (4mks)

Question Two (20mks)

(a) Solve the following quadratic equations using the stated method

(i) $12x^2 + 17x + 5 = 0$ by factorization. (2mks)

(ii) $3x^2 - 1 Ix + 10 = 0$ by completing square method. (3mks)

(d) Solve $x^4 + 5x^3 + 5x^2 - 5x - 6 = 0$. (7mks)

Question Three (20mks)

(a) Given that SinA = $-^5$ and Cos B = 8 without using mathematical tables and calculator,

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evaluate;

(i) Sin(A+ B). (2mks)

(ii) cos(A - B). (2mks)

(iii)Tan(2A). (2mks) sin(A+B)

(b) Prove that tanA + tanB = ______cosA cosB (3mks) (c) Solve for x in the equation $\cos 2x - 3\cos x + 2 = 0$, where $0^0 < x < 360^0$.

(5mks)

(d) A boy wants to invite 10 friends but there is only a room for 5 of them. In how many ways can he choose whom to invite if the two of them are brothers and must not be separated?

(4mks)

(e) In how many distinct ways can the word KARIRIGANIA be reananged?(2mks)

Question Four (20mks)

a) Find the possible values of x if $2^{2r} - 42(2^{X}) + 320 = o$ (5mks)

b) Solve the equation 210g5x+ 210gx 5 = 5 (5mks)

(c) The difference between the 7^{th} and the 3^{rd} term of an arithmetic series is 28 and the 10^{th} tem of the same series is 68. Find the first term and the common difference, hence determine the sum of the 20 terms. (5mks)

(d) Determine the number of complete years for which a single investment should be held at

7% compound interest per annum in order to realise double its original value. (5mks)

Question Five (20mks)

(a) The table below shows the distribution of height to the nearest cm of 40 students.

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Height (cm)	145-149	150-154	155-159	160-164	165-169	170-174	175-179
Frequency	2	5	16	9	5	2	1

Calculate:

(i) Mode. (3mks)

(ii) Median. (3mks)

(iii) Inter-quartile range. (4mks)

(iv) Mean. (2mks)

(v) Standard deviation. (3mks)

b) A factory produces a large output of light bulbs every day, of which 5% are known to be defective. If a sample of 10 light bulbs is taken at the end of the day. Let X be the number of defective light bulbs in the sample;

(i) Write down the distribution of X. (2mks)

(ii) What is the probability that at least three bulbs are faulty if 5% of the day's production are faulty? (Answer to three d.p). (3mks)