BAYERO UNIVERSITY, KANO

FACULTY OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE

2020/2021 First Semester Examination

MTH1301: Elementary Mathematics I

Instruction: Answer Any Five (5) Questions

Time Allowed: 3 Hours

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1. (a) An AP is such that the third term equals twice the first term. The sum of the first ten terms is 195. Find the first term and the common difference. *5Marks*

   (b) split this expression into its partial fraction $\frac{10}{x(x-1)(x+4)}$ *5Marks*

   (c) Show that the arithmetic mean A of any two positive numbers x and y is greater than their geometric mean G. *4Marks*

2. (a) The number $x+1$, $x+5$, and $2x+4$ are consecutive terms in a GP. Find the possible values of x, and of the common ratio. Also, find the values of the three given terms in each case. *5Marks*

   (b) Find the partial fractions for $\frac{x^2+4x-2}{x^2+5x+6}$ *5Marks*

   (c) If $A = \{a, b, c, d\}$ find the $P(A)$ (the power set of A. *4Marks*

3. (a) Split $\frac{3}{(x+1)(x^2+4)}$ into the sum of its partial fractions. *5Marks*

   (b) Show that $(x-2)$ is a factor of $x^3 + 2x^2 - 5x - 6$, and find the other two factors. *5Marks*

   (c) Using equileteral triangle of sides 2 units, show that: *4Marks*

   i. $sin30^0 = cos60^0$ ii. $tan30^0 = \frac{1}{\sqrt{3}}$

4. (a) In anlyzing the number of applicants for 2021 oversea scholarship, it was discovered that 70 of the applicants applied for Chinese government scholarship, 65 for Japanese government scholarship, and 85 for Saudi Arabian scholarship. 40 applied for Chinese government only, 20 for Japanese government only, and 45 for Saudi Arabian scholarships only. 15 applied to all the three scholarships. If each apllied to atleast one scholarship, find the number that:

   i. applied to both Chinese and Japanese government scholarships.

   ii. applied to both Chinese and Saudi Arabian scholarships.

   iii. applied to both Japanese and Saudi Arabian scholarships. *10Marks*

   iv. applied to atleast one scholarship.

   (b) Write down the first five terms of the expansion of $(2x - \frac{1}{2}y)^{12}$ *4Marks*

5. (a) Find the coefficient of x^5 in the expansion of $(2x+1)^{15}$. *5Marks*

   (b) Given that $cos^2\theta + sin^2\theta = 1$, solve $1 + cos\theta = 2sin^2\theta$ for $0^0 \leq \theta \leq 360^0$. *5Marks*

   (c) Solve the following pair of simultaneous equation: $\begin{cases} 5p - 2q = 9 \\ 2p + 5q = -8 \end{cases}$ *4Marks*

6. (a) Find the coordinates of the points which divide the line joining (–2, –3) and (6, 9) in the ratio 1: 3 and hence find the distance between the two coordinates above. *5Marks*

   (b) Make t to be the subject of the equation $S = ut - \frac{1}{2}gt^2$ *4Marks*

   (c) If **a**, **b**, and **c** are constant, prove that $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$ provided that $ax^2 + bx + c = 0$. *5Marks*

7. (a) Find the remainder when $f(x) = 3x^3 - 4x^2 + 5x - 2$ is divided by $(x-2)$. *4Marks*

   (b) Solve $tan\theta = 2sin\theta$ for $-180^0 \leq \theta \leq 180^0$. *5Marks*

   (c) By completing the square method solve the following quadratic equation $(2x-3)(2x-3) = 25$. *5Marks*

Wishing you all the best