**PIONEER INTERNATIONAL UNIVERSITY**

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**UNIVERSITY EXAMINATIONS (SPECIAL PAPER)**

ACADEMIC YEAR: **2019/2020** UNIT NAME: **College Algebra**

SEMESTER: **MAY- AUGUST 2020** UNIT CODE: **DBM 112**

DATE: **JULY 2020** TIME: **2 HOURS**

**Instructions: Answer SECTION A (Compulsory) and Any Other Two Questions**

**SECTION A (30Marks)**

(a) Solve the following;

(i) If $A = \begin{bmatrix} -5 & -2 & 1 \\ 4 & 3 & 3 \\ -6 & 6 & -2 \end{bmatrix}$

Find the matrix B such that;

$A + B =$ Unit matrix. [ 3 marks]

(ii) If $A = A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & 4 & 2 \\ 1 & 0 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 1 & 2 \\ 1 & 6 & 1 \\ 2 & 3 & 4 \end{bmatrix}$

Find AB and BA [ 4 marks]

(iii) Find the determinant value of the matrix

$A = \begin{bmatrix} 2 & 1 & 2 \\ 3 & 2 & 2 \\ 4 & 5 & 1 \end{bmatrix}$ [ 3 marks]

(b) Find the inverse of the matrix

$A = \begin{bmatrix} 3 & 2 & 1 \\ 2 & 1 & 4 \\ 5 & 2 & 1 \end{bmatrix}$ [ 2 marks]

(c) Solve the equation below using Cramer's rule

$x + y + z = 1$

$2x + 2y + 3y = 6$

$x + 4y + 9y = 3$ [ 5 marks]

(d) Find the $16^{th}$ and $20^{th}$ term of the Arithmetic progression (A.P)

3.75, 3.50, 3.25,.....

[3 marks]

(e) Three number are in a geometric progression (G.P). Their sum is 21 and their product is 216. Find the numbers. [3 marks]

## QUESTION TWO [15 MARKS]

a) Matrix X gives the details of component parts used in the make up of two products $P_1$ and $P_2$ matrix Y gives details of products made on each day of the week as follows:

Matrix X

| Products | A | B | C |
|---|---|---|---|
| $P_1$ | 3 | 4 | 2 |
| $P_2$ | 2 | 5 | 3 |

Matrix Y

| | Products $P_1$ | $P_2$ |
|---|---|---|
| Mon | 1 | 2 |
| Tues | 2 | 3 |
| Wed | 3 | 2 |
| Thur | 2 | 2 |
| Fri | 1 | 1 |

Use matrix multiplication to find the number of component parts used on each day of the week. (8 marks)

b) Solve for x by Quadratic formula ( 7 marks)

$5x^2 + 2x - 3 = 0$

$2x^2 + 3x - 2 = 0$

## QUESTION THREE [15 MARKS]

a) 250 members of a certain society have voted to elect a new chairman. Each member may vote for either one or two candidates. The candidate elected is the one who polls most votes

Three candidates x, y z stood for election and when the votes were counted, it was found that

- 59 voted for y only, 37 voted for z only
- 12 voted for x and y, 14 voted for x and z
- 147 voted for either x or y or both x and y but not for z
- 102 voted for y or z or both but not for x

**Required DRAW a venn diagram and find;**

i) How may voters did not vote [ 3 marks]

ii) How many voters voted for x only [ 3 marks]

iii) Who won the elections [ 3marks]

a. $\log_5\left(\frac{5}{3}\right)$ b. $\log_5 8$ c. $\log_5 36$

b) **Solve** the following [ each 2 marks]

**QUESTION FOUR [15 MARKS]**

(a) Show that the sum of the first n terms of a geometric progression (GP) is given by

$$S_n = \frac{a(1-r^n}{1-r}$$

Where a is the first term and r the common ration and $|r| < 1$. Hence or otherwise, find the sum of the first six terms of the GP

8, 24, 72 … ( 5 marks)

(b) Find the sum of an arithmetic progression of 10 terms whose first term is 7 and whose last term is 10. (4marks)

(c) An arithmetic progression has 3 as its first term. Also, the sum of the first 8 terms is twice the sum of the first 5 terms. Find the common difference. ( 4 marks)

(D) h) Write down the 10th and 19th terms of the APs (3 marks)

(i) 8, 11, 14, . . .,

(ii) 8, 5, 2 . . ..