PAN AFRICA CHRISTIAN UNIVERSITY

DIPLOMA IN INFORMATION AND COMMUNICATION TECHNOLOGY

END OF SEMESTER EXAMINATION

DEPARTMENT: COMPUTING AND INFORMATION TECHNOLOGY

COURSE CODE: DICT0114

COURSE TITLE: FOUNDATION MATHEMATICS

EXAM DATE: XXXXX XXXXX/AUGUST,2021

TIME: XXXXX

INSTRUCTIONS

- This exam script has **TWO (2)** sections.
- Read all questions carefully before attempting.
- Answer All questions in Section **A** and any other Three questions in Section **B.**
- Write only your **student number** on the answer booklet provided.

SECTION A
(Answer ALL questions in this section)

Question 1:

a) Convert the following: **[4 Marks]**

i. $94B_{16}$ to decimal equivalent

ii. 12.5625_{10} to binary number

b) Given set *A = {1,2,3,4} and D={4,5,6}*. Find A∪ D **[1 Mark]**

c) Given the matrices below;

$$A = \begin{bmatrix} 1 & 3 \\ 2 & -1 \end{bmatrix} \text{ and } B = \begin{bmatrix} 2 & 0 & -4 \\ 3 & -2 & 6 \end{bmatrix}.$$

Find:

i. A+B **[2 Marks]**

d) Given the following sets.

A={5,6} B={a,b,c}

Find the:

i. Cardinality of set B **[1 Mark]**

ii. Powerset of set B **[2 Marks]**

SECTION B
(Answer any FOUR (3) questions in this section)

Question 2:

a) Let **U** = {a,b,c,d,e,f,g,h,i,j} be the universal set, and let

A = {a,b,c,d,e,f,g}, B = {b,d,f,i,j}, C= {a,c,f,j}.

Find:

i. A∩B **[2 Marks]**

ii. A/B **[2 Marks]**

iii. $(A \cup C)^C \cap B$ **[3 Marks]**

iv. $(A/C)^C$ **[3 Marks]**

Question 3:

a) Construct the truth table of $\neg p \wedge q$. **[4 Marks]**

b) Prove that the proposition $(p \longrightarrow q) \leftrightarrow (\sim q \longrightarrow \sim p)$ is a tautology. **[6 Marks]**

Question 4:

a)Let $A=\begin{bmatrix}1 & 2\\ 3 & -4\end{bmatrix}$, $B=\begin{bmatrix}5 & 0\\ -6 & 7\end{bmatrix}$

Find:

i. AB **[3 Marks]**
ii. Inverse of A **[2 Marks]**

b) Find the determinant of matrix B: **[5 Marks]**

$$B=\begin{bmatrix}4 & -1 & -2\\ 0 & 2 & -3\\ 5 & 2 & 1\end{bmatrix};$$

Question 5:

a) Determine the number of all the rearrangements in the following letters using permutation:

i. EXCELLENT **[2 Marks]**

ii. MISSISSIPPI **[2 Marks]**

b) A pair of dice is tossed. Find the number of elements in each of the following event:

i. Two numbers are equal **[2 Marks]**
ii. Sum is 9 or more **[2 Marks]**
iii. 3 appears on at least one die **[2 Marks]**

Question 6:

A survey on a sample of 25 new cars being sold at a local auto dealer was conducted to see which of three popular options, air-conditioning *(A)*, radio *(R)*, and power windows *(W)*, were already installed. The survey found:

15 had air-conditioning *(A)*, 12 had radio *(R)*, 11 had power windows *(W)*, 5 had *A* and *W*, 9 had *A* and *R*, 4 had *R* and *W*, 3 had all three options.

a) Fill in the correct number of cars in each of the regions on the Venn diagram.

[5 Marks]

b) Find the number of cars that had:

i. Only R **[1 Mark]**

ii. Only one of the options **[2 Marks]**

iii. None of the options **[2 Marks]**

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