FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

SCHOOL OF INFORMATION AND COMMUNICATION TECHNOLOGY

DEPARTMENT OF INFORMATION AND MEDIA TECHNOLOGY

SECOND SEMESTER 2015/2016 EXAMINATION

COURSE CODE:	CIT 224
COURSE TITLE:	DISCRETE MATHEMATICAL STRUCTURES
CREDIT UNITS:	3
TIME ALLOWED:	2HRS 45MIN
COURSE LECTURER(S):	Mrs Stella O. Etuk
NUMBER OF QUESTIONS:	3
NUMBER OF PAGES:	2 (INCLUDING THIS PAGE)

INSTRUCTIONS

- Answer all questions
- Do **not** use red pen
- Please use a clear handwriting
- This exam is closed book, closed notes, closed laptop and closed cell phone
- Please use non-programmable calculators only

Question 1

a. State whether the following statements are or are not propositions? What are the truth values of those that are propositions?

i. What time is it now?
ii. $4 + x = 5$
iii. CIT 224 is a 3 unit course
iv. There are no female lecturers in FUTminna
v. Sit where you are.
vi. Where can I find the venue?

(4mks)

b. Construct a truth table for each of these compound propositions.

i. $(p \wedge q) \rightarrow (p \vee q)$
ii. $(p \leftrightarrow q) \oplus (\neg p \leftrightarrow q)$

(6mks)

c. Let p, q, and r be the propositions

p :You get an A on the final exam.

q :You do every exercise in the textbook.

r :You attend every lecture on CIT 224.

Express the following English statements as logical propositions using logical connectives (including negations).

i. You get an A on the final exam if you attend every lecture on CIT224 and you do every exercise in the textbook
ii. You will get an A on the final exam if and only if you attend every lecture on CIT224
iii. If you attend every lecture on CIT 224 or you do every exercise in the textbook or you do both, then you will get an A on the final exam
iv. If you did not attend every lecture on CIT 224 and you do every exercise in the textbook, then it is not the case that you get an A on the final exam
v. If you did not get an A on the final exam, then it implies you did not attend every lecture on CIT224 or you did every exercise in the textbook

(10mks)

Question 2

a. Let **A= {x, y, z}** and **B= {1, 2,}** and **C={a, b}**be sets. Find the following
i. AXB ii. $|B|$ iii. $P(A)$ iv. BXC v. $A \cup B$ (5mks)
b. Prove by contradiction that there is no integer that is both even and odd (5mks)
c. Consider the "less than or equal to" relation on the set $\boldsymbol{A} = \{\mathbf{0}, \mathbf{2}, \mathbf{5}, \mathbf{10}, \mathbf{11}, \mathbf{15}\}$ such that aRb implies $a \leq b$.
i. Show that this relation is a partial order on$\boldsymbol{A}$.
ii. Draw a Hasse diagram for the "less than or equal to" relation.
iii. List the maximum elements, minimum elements, greatest element and least element

(10mks)

Question 3

a. Construct a circuit from inverters, AND gates, and OR gates to produce the output

i. $xyz + x\bar{y}\bar{z} + \bar{x}yz + \bar{x}\bar{y}z$

ii. $xyz + x\bar{y}z$ (10mks)

b. Use K-Map to minimize the sums-of-product in 3a above (10mks)