

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF INDUSTRIAL TECHNOLOGY
BACHELOR OF ENGINEERING (HONS) DEGREE

Supplementary Examination August 2011

TEE 1202 GRAPHICS AND DESIGN FOR ELECTRONIC ENGINEERS

Duration of Examination 3 Hours

Instructions to candidates:

1. Answer **ALL** questions from section one.
2. All questions carry equal marks (25)
3. Create a new folder and name it "user name **TEE1202 EXAM**".
4. Save all your answers in your profile inside Folder "eg user name **TEE 1202 EXAM**".
5. Make sure your **ANSWERS ARE SAVED** in the right place
6. Save Question 1 as Q1, Question 2 as Q2, etc

SECTION A

Answer all

Question 1

A 3 bit machine has to count products for grading and packaging purposes into cases. Each package case should be a set of 210 similar size items. The machine count does not exceed a count of three bits at once. This means maximum machine count per given time is 7 or any number below 7.

- a) Using a flowchart design a program for the above counting machine.
- b) Using Cadkey show the flowchart and label the diagrams.

Question 2

Design a power supply with the following component specifications:

- ✚ Transformer 10T01 – Subcircuit Trans2.
- ✚ Two polarised capacitors of $100\mu\text{F}$ each.
- ✚ Input Supply of $-170/170\text{V}$ 60Hz from Analog Signal Generator.
- ✚ Bridge Rectifier 18DB10.
- ✚ Series Transistor 2N2222A.
- ✚ Zener diode 1N4736.
- ✚ Biasing Resistor 680Ω .

- a) Show the Schematic circuit in your answer book.
- b) Using CircuitMaker design the power supply and show your simulations.
 - i. Write down unregulated V_{out} and Regulated V_{out} .
 - ii. How much is the ripple amount of the Unregulated V_{out} .
 - iii. Show input Supply values both input and output of transformer.
 - iv. Show the frequency of the input signal.

SECTION B

Answer two question.

Question 4

The motherboard of a personal computer carries a microprocessor (type NUST100) which has a data bus of 16 lines, and an address bus of 22 lines (numbered 0 to 21). The board incorporates two memory chips (M1 and M2), and an input/output chip (PIA). All the lines of the data bus are connected from NUST100 to each of the other three chips. The address bus from NUST100 is split so that lines 0 to 10 go to M1, while 0 to 9 plus 11 go to M2. lines 18 to 21 go to the PIA.

Draw a schematic block diagram for the motherboard using Cadkey.

Question 5

An electrolysis method is used for extraction of gold from the ore in a gold processing plant. The electrolyte used is a cyanide solution. The cyanide concentration and consequently the **ph** of the solution is closely controlled for maximum extraction. A **ph** of 2.4 is to be maintained. Should the **ph** exceed 2.4 a signal is sent to the central processing unit and the cyanide tank valve is closed so that no more cyanide is added to the solution, and should the **ph** drop below 2.4 a signal is sent to the central processing unit and the cyanide tank valve opens so that more cyanide is added to the solution. This ensures that the **ph** remains constant. Should there be extreme deviation of **ph** a signal is generated so that the plant stops instantly. Using a flowchart, design a program to implement the above processing plant. Using any software program of your choice draw the flowchart.

Question 6

Design a logic circuit using AND, OR, NAND, NOR or NOT gates to implement the following equation.

$$M = (((W \text{ AND } X) \text{ OR } (Y \text{ AND } Z)) \text{ OR } ((/W \text{ AND } /Y) \text{ OR } (/X \text{ AND } /Z))) \text{ AND } (W \text{ OR } Z)$$

where **W**, **X**, **Y**, **Z** are inputs and **M** is output. A slash "/" means that a value is complimented (i.e. NOT operation is performed on it).

Present your design as a circuit diagram using CircuitMaker.

End of Exam