

**BOWEN UNIVERSITY, IWO. OSUN STATE. NIGERIA**  
**COLLEGE OF AGRICULTURE, ENGINEERING, AND SCIENCE**  
**PHYSICS PROGRAMME**

**FIRST SEMESTER EXAMINATION 2022/2023 SESSION**

**PHY 452: DIGITAL ELETRONIS (2 CREDITS)**

**DATE: 19<sup>th</sup> June, 2023**

**TIME: 8.30am – 10.30am**

**INSTRUCTION: Answer All Questions in Section A and Two Questions in Section B**

**Section A (Answer All)      1 mark each**

- (1) An inverter gate is -----
- (2) Digital circuit can be made by the repeated use of what gate
- (3) What input signal would be applied to a NOT gate for the output to be 0
- (4) If the inputs of a NAND gate are connected together. The resulting circuit is-----
- (5) An OR gate has 4 inputs. One input is high and the other three are low. The output is
- (6) The only function of NOT gate to the input signal is -----
- (7) Which of the gate is universal gate?
- (8) A device which converts BCD to seven segments is called-----
- (9) For the gate in the given figure below the output will be .....

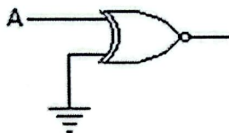


Fig.1

- (10) . A ring counter with 5 flip flops will have ..... states.
- (11) The access time of a word in 4 MB main memory is 100 ms. The access time of a word in a 32 kb data cache memory is 10 ns. The average data cache hit ratio is 0.95. The efficiency of memory access time is .....
- (12) An AND gate has two inputs A and B and one inhibit input 3, Output is 1 if
- (13) According to Boolean law:  $A + 1 = ?$
- (14) In DTL(digital transistor Logic) logic gating function is performed by-----
- (15) In DTL amplifying function is performed by-----
- (16) How many stages a DTL consist of?
- (17) The propagation delay in DTL is relatively -----
- (18) A full adder can be made out of .....
- (19) A 12 bit ADC is used to convert analog voltage of 0 to 10 V into digital. The

resolution is-----

- (20) The basic storage element in a digital system is-----
- (21) A counter type A/D converter contains a 4 bit binary ladder and a counter driven by a 2 MHz clock. Then conversion time is .....
- (22) A memory system of size 16 k bytes is to be designed using memory chips which have 12 address lines and 4 data lines each. The number of such chips required to design the memory system is .....
- (23) The output of a half adder is-----
- (24) Integrated circuit ICs are generally made of -----
- (25) If the arrow of crystal diode symbol is positive w.r.t. bar, then diode is ..... biased
- (26) The knee voltage of a crystal diode is approximately equal to .....potential
- (27) A zener diode is used as .....regulator
- (28) How much input and output needed for demultiplexer?
- (29) An audio amplifier is an example of .....
- (30) The active components in an IC are .....

### Section B ANSWER ANY TWO QUESTIONS

#### Question 1

(a) Convert the following to indicated bases

- (i)  $123.5_8$  to denary and  $134.25_{10}$  to octal 2marks each
- (ii)  $10101100110.1100_2$  to octal and  $124.2_8$  to binary 2marks each
- (iii)  $2C4.D2_{16}$  to decimal  $726.75_{10}$  to hexadecimal 2marks each

Showing all workings and justify the use of octal and hexadecimal bases in digital Systems

(b) Perform the following operations as in the computer

- (i)  $5.78_{10} + 0.25_{10}$  (ii)  $42.6_{10} \cdot 6_{10}$  (iii)  $-7_{10} - 6_{10}$
- (iv)  $(2\frac{1}{2})_{10} + (6\frac{3}{4})_{10} - (4\frac{7}{8})_{10}$  2marks each

20marks

#### Question 2

- (a) (I) State (i) De – Morgan’s laws 2marks
- (ii) Boolean law 2marks

- (II) Distinguish between (i) POS and SOP 1mark  
(ii) Standard min term and maxterm 2marks
- (b) (i) Briefly explain the operation of DIODE AND logic circuit. Draw the truth table 2marks  
(ii) How would you modify the circuit drawn in (i) to obtain a NAND logic circuit 2marks  
(iii) Draw and state the advantage of a TTL NAND gate 2marks
- (c) List four advantages of integrated circuits (ICs) and compare the performance of 3 types of logic families under the following sub – headings:  
(i) Power dissipation,  
(ii) fan – in,  
(iii) fan – out,  
(iv) time delay noise and  
(v) capacity 5marks
- (d) Give with reasons, the appropriate logic to be selected if (i) a subtractor circuit (ii) a digital computer and (iii) a switch were to be designed 2marks  
20marks

### QUESTION 3

- (a) A Student is to be admitted into computer science department, if he has a credit in Maths and any two of Physics, Chemistry and English language.
- (i) Draw a truth table to indicate when the student secures an admission 5marks  
(ii) Write out the output function 5marks  
(iii) Using K – map or otherwise, implement the simplified output of a (iii) using appropriate logic circuits. 5marks
- (b) Determine the Output Q of the logic circuit in Fig. 2 and present a minimal circuit.

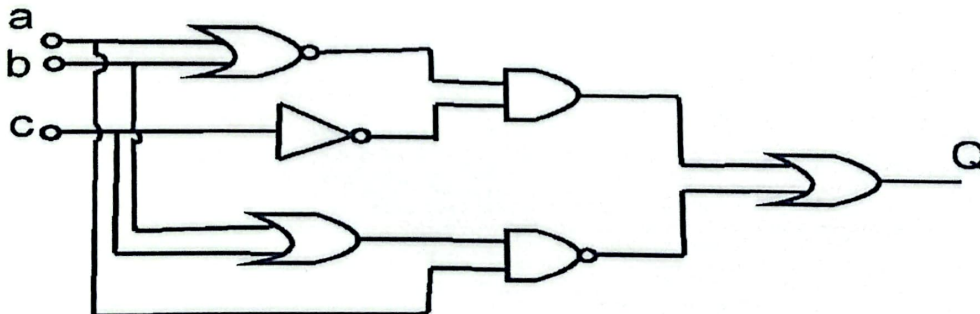


Fig. 2

5marks  
20marks

*Moderated*  
*S. K. M. S. S. S.*  
*07/06/2023*