



## UNIVERSITY OF GHANA

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## DCIT 102

**A1**

- How many bits is needed to distinctly address 226KB in a byte addressable Memory?
- Compute the  $111010_2 + 110010_2$  in signed magnitude form.
- Simplify  $f(a,b,c) = a.\bar{b} + a.(\bar{b} + c) + (a.b.(c + \bar{b}.d) + a.\bar{b}).c.d$
- Compute  $ADBE_{16} - 5AF4_{16}$  using 2's complement arithmetic

**A2**

- Compute the value of  $65_{10} - 86_{10}$  using 8-bit sign magnitude in binary
- Compute the value of  $756276_8 + E7BAD_{16} - E5ACF_{16}$  in 15's complement
- Compute the value of  $75_{10} - 45_{10}$  using 7-bit 2's complement sign magnitude
- Compute  $657_{10} + 345_{10} + 865_{10}$  in BCD leaving your final answer in decimal
- Express  $F(X,Y,Z,W) = \sum (0,2,8,10)$  as a sum of Minterms and construct the logic circuit diagram for the minimal SOP

**A3**

- Convert the following word problem into a logic working and design a circuit diagram for the resultant Boolean function. The light bulb (L) is ON if switch A (A) is OFF and switch B (B) is ON and either switch B (B) is OFF, or switch (C) is ON.
- The computation of the weight of a new genome for DNA sequencing at Zizi research lab was done based on a decimal system scheme. The computation of the new genome involves choosing a two (2)-digit number such that the ones (unit) digit of the number exceeds the tens (10) digit by a 3 and the product of the number and the sum of its digits amounts to 175.
  - Compute the weight of the new genome in decimal scheme.
  - The DNA sequencing operates in Hexadecimal scheme, hence compute the final weight of (i) above in Hexadecimal scheme

**A4**

- Explain the significance of the GPU in the in the design of modern computer systems
- Is it possible of designing CMOS with ROM technology? Support your claim
- How does the DIMM memory technology offer better performance over the SIMM memory technology
- Explain how the memory hierarchy helps in solving the design constraint of computers' memory
- Explain the difference between the SCSI and SAS storage interface technologies and state how their mode of transmission impact performance