



TRƯỜNG ĐẠI HỌC BÁCH KHOA HÀ NỘI TRƯỜNG ĐIỆN – ĐIỆN TỬ Exam number: 01 Tổng số trang: 1		ĐỀ THI CUỐI KỲ 2021.1 Học phần: EE2130E – Thiết kế hệ thống số Ngày thi (Date): 09/02/2022 Thời gian làm bài (Time Exam): 90 phút (90 mins) (Được sử dụng tài liệu) (Paper documents are used)
Ký duyệt	Trưởng nhóm/Giảng viên phụ trách HP:  Trần Thị Anh Xuân	Khoa phụ trách HP: Khoa Tự động hóa  Phạm Việt Phương

Question 1: (2 points)

- a) Given: $N_{10} = 568$; $A_{10} = 339$. Convert to the following base systems N_{16} , A_{16} , $N_{\text{packed BCD}}$, $A_{\text{packed BCD}}$
- b) Directly perform the following math: $N_{\text{BCD}} + A_{\text{BCD}}$; $N_{16} - A_{16}$

Question 2: (3 points)

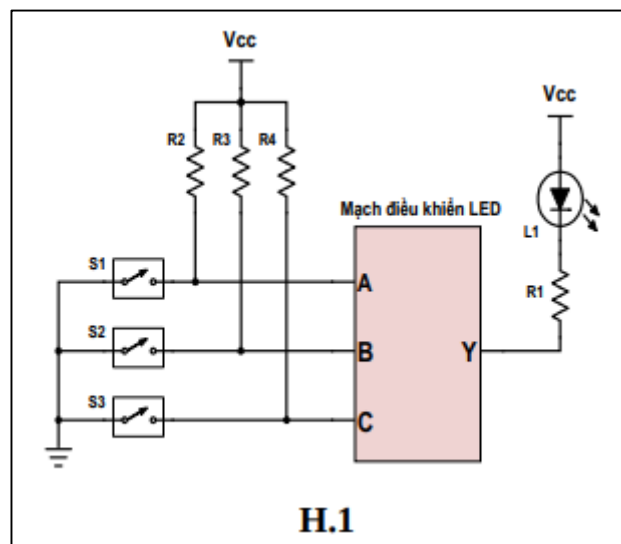
Given Led L1 control circuit in Figure H.1.

The three inputs of the circuit are A, B and C that receive control signals from 3 switches S1, S2 and S3. Know that Led L1 is only on when:

- Or the switch at S1, S2 is closed and S3 is open
- Or the switch at S1, S3 is closed and S2 is open

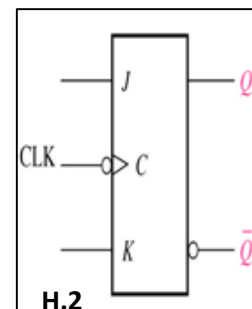
Design a logic circuit to control Led L1:

- a, Use only 2-input NAND gates
- b, Use 1 Decoder and basic/extended logic elements if needed
- c, Use 1 MUX and basic/extended logic elements if needed



Question 3: (3 points)

Design of synchronous counter with module 15, cyclic up counter, counting on the negative edge trigger of the input count pulse, using J-K FFs as shown in Figure H.2 and basic/extended logic elements if needed.



Question 4: (2 points)

Given the DAC circuit diagram as Figure H.3.

Know QA, D0: LSB ; QD, D3 : MSB ;

$U_{\text{DAC}} = q * N_x$ ($q = 0.2V$; N_x is the value of the DAC input)

Calculate and draw the U_{DAC} characteristic when IC 74191 counts up, Knowing IC 74191 is a module 16 cyclic synchronous counter.

