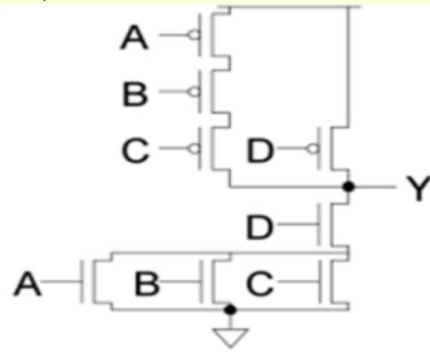# FALL-SEM (2021-2022)

CAT-1 QUESTIONS

1.

1). Write an output expression of Y for the following CMOS logic diagram and mention the name of the logic gate from the output expression Y. (5 Marks)

2). Perform the following addition operations:
1. $(275.75)_{10} + (37.675)_8$ (3 Marks)
2. $(AF1.B3)_{16} + (FFF.E)_{16}$ (2 Marks)

2. S

1). In an aircraft there are three lavatories, each lavatory has a sensor outputting 1 if the lavatory door is locked, 0 otherwise. Draw the Aircraft lavatory sign circuit that outputs lavatory available sign by setting the circuits output to 1. Apply DeMorgan's law in the aircraft lavatory sign equation. (5 Marks)

2) In an automatic sliding door system an input p to the system indicates whether a sensor detects a person in front of the door (p = 1 means a person is detected. An input h indicates whether the door should be manually held open (h = 1) regardless of whether a person is detected. An input c indicates whether the door should be forced to stay closed (like when the store is closed for business)- c = 1 means the door should stay closed. The latter two would normally set by the manager with a proper keys. An output f opens the door when f is 1. We want to open the door if the door is set to be manually held open OR if the door is not set to be manually held open but a person is detected. However in either case we only open the door if the door is not set to stay closed.
Write the Boolean expression and simplify the same. (5 Marks)

3.

1). Simplify the following Boolean function using K-map and obtain the SOP and POS expression for the same.

$F = \sum m$ (0, 1, 2, 5, 6, 7, 8, 10, 11, 12, 13, 15). (5 Marks)

2). Simplify the following Boolean expression using K-map and implement using NOR gates only.

$F = \sum m$ (0, 7, 8, 10, 13)+ d(1, 2, 3, 5, 15) (5 Marks)