INTERNATIONAL CENTRE FOR APPLIED SCIENCES
MAHE, MANIPAL

B.Sc. (Applied Sciences) in Engg.

End – Semester Theory Examinations – Nov./ Dec. 2020

III SEMESTER - SWITCHING CIRCUIT AND LOGIC DESIGN (ICS 232)

(Branch: CS)

Time: 3 Hours **Date: 25 November 2020** **Max. Marks: 50**

- ✓ **Answer ALL the questions.**
- ✓ **Missing data, if any, may be suitably assumed**
- ✓ **Plagiarism in any format will invite penalty marks.**

1A. With the help of an appropriate logic circuit explain how a circuit with basic gates can be converted to a NOR only logical network. Support your answer with suitable switching expressions. **[5M]**

1B. For the switching function given below:

$$\boldsymbol{Y = A + (B + C')(D'E + F)}$$

I: Realise the function using network of logic gates.

II: Obtain an equivalent NAND only circuit. **[5M]**

2A. Discuss the power dissipation in PMOS and NMOS transistors. Examine how the power is dissipated in NMOS transistors with suitable example in any logic gate NMOS circuit. **[5M]**

2B. Simplify the logic circuit shown in the Fig 2B. with the help of circuit diagrams. Do not use algebraic simplification. **[5M]**

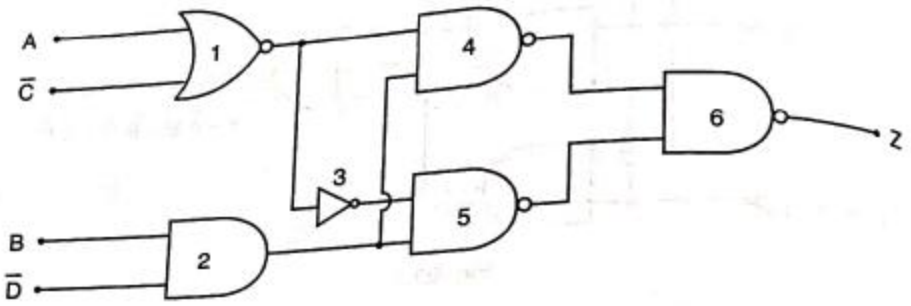

Fig 2B.

3A. Realise the following switching functions: **[5M]**

I: $Y = \overline{AB} + A + (\overline{B + C})$ using NAND gates only

II: $Y = wx' + wy + x'y' + x'z'$ using NOR gates only

3B. For the circuit diagram given in Fig 3B.: **[5M]**

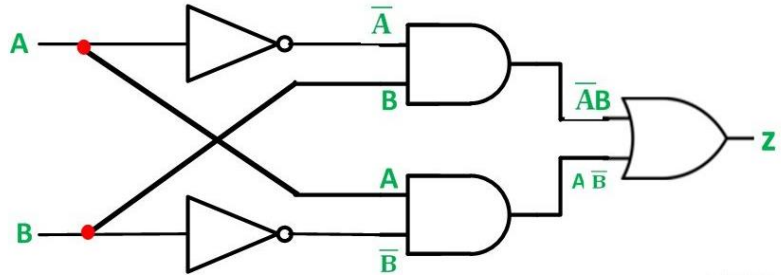

Fig.3B.

I: Convert the circuit given in Fig 3B. to an equivalent circuit comprising of a single type of gate.

II: If the above circuit is implemented in CMOS, calculate how many transistors are required for the circuit to function. Perform a cost analysis and give suitable solution in case of high cost.

4A. In any electronic circuit optimization is important. Explain the concept of fan–in and fan-out with the help of an example. **[5M]**

4B. With the help of a neat block diagram explain the structure of a FPGA **[5M]**

5A. Explain the significance Programmable Array Logic (PAL'S) and Programmable Logic Arrays (PLA's) in the evolution of Field Programmable Gate Arrays (FPGA). **[5M]**

5B. With the help of an example explain the use of transmission gates. **[5M]**

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