

Total No. of Questions : 10]

SEAT No. :

991

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PE5708

[6582]-204

S.E. (Artificial Intelligence & Data Science) (CSE)
MDM-221-AID-CAI: DIGITAL ELECTRONICS AND LOGIC DESIGN
(2024 Pattern) (Semester - III)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Numeric figures in square brackets [] indicate full marks.
- 4) Use of electronic pocket calculator is allowed.
- 5) Assume suitable data, if necessary.

- Q1) a) Simplify $F(A, B, C, D) = \sum m (0, 1, 2, 4, 5, 6, 8, 9, 12, 13, 14)$ using K-map and implement using logic gates. [5]
- b) Convert octal (725.25) into its decimal, binary and Hexadecimal equivalent. [5]
- c) Explain binary subtraction using 1's complement and two's complement method with example. [4]

OR

- Q2) a) Convert 42 and 22 in BCD and add them in BCD form. [5]
- b) Reduce $F(A, B, C, D) = \sum M (0, 1, 2, 4, 5, 7, 10, 15)$ using K-map and implement using logic gates. [5]
- c) Convert the following expressions into standard SOP and POS form. [4]
- i) $AB+BC+AC$
- ii) $(A+B)(\bar{B}+C)$

- Q3) a) Design and draw full adder circuit using 4:1 MUX. [7]
- b) Design 3-bit binary to gray code converter circuit and implement using logic gates. [7]

OR

- Q4) a) Explain and implement 2-bit magnitude comparator circuit using logic gates. [7]
- b) Design BCD to excess-3 code converter. Also implement the circuit. [7]

P.T.O.

- Q5) a) Explain working of SR Flip flop with neat block diagram and truth table. [6]
b) Differentiate between synchronous and asynchronous counters. [4]
c) Write short note on Shift registers. [4]

OR

- Q6) a) Design a 3-bit asynchronous UP counter using T flip-flops. [6]
b) Enlist difference between Mealy and Moore circuits. [4]
c) Explain in details Twisted Ring Counter. [4]

- Q7) a) Explain architecture of 8086 microprocessor with diagram. [7]
b) Explain in details GPU-based AI processing with its applications. [7]

OR

- Q8) a) Draw and explain the ARM Cortex architecture in details. [7]
b) Write an Assembly Language Program (ALP)/C language code for [7]
i) addition of two integers
ii) variable assignment
iii) if-else statement

- Q9) a) Explain the concepts of Edge AI & Cloud AI processing. [5]
b) Enlist the AI-focused processors types. Explain any two in brief. [5]
c) Explain how TPUs differ than GPUs. [4]

OR

- Q10) a) What do you understand by the term Heterogeneous Computing? Explain. [5]
b) Explain key AI performance metrics such as FLOPS, TOPS, latency and power efficiency and discuss how they influence processor selection. [5]
c) How do VPUs contribute to vision-based AI applications such as image recognition and video analytics? [4]

