Printed Page:-03 Subject Code:- BCSIOT0302

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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: III - THEORY EXAMINATION (2024 - 2025)

Subject: Logic Design and Microcontroller

Time: 3 Hours Max. Marks: 100

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. This Question paper comprises of three Sections -A, B, & C. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.

2. Maximum marks for each question are indicated on right -hand side of each question.

3. Illustrate your answers with neat sketches wherever necessary.

4. Assume suitable data if necessary.

5. Preferably, write the answers in sequential order.

6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION-A 20

1. Attempt all parts:-

1-a. The Octal equivalent of Binary number 1101 is----. (CO1,K1) 1

(a) 11

(b) 12

(c) 13

(d) 15

1-b. Which of the following circuit can be used as parallel to serial converter? (CO1,K1) 1

(a) Multiplexer

(b) Demultiplexer

(c) Decoder

(d) Digital counter

1-c. In the Moore circuit/ machine, the output depends _____. (CO2,K1) 1

(a) Only on inputs

(b) Only on states

(c) Both on input and staes

(d) None of these

1-d. The race around condition is related to----------flip-flop. (CO2,K1) 1

(a) S R

(b) T

.

(c) J K

(d) D

1-e. What is stored in the H & L general-purpose register? (CO3,K1) 1

(a) Opcode

(b) Address of memory

(c) Address of next instruction

(d) Temporary data

1-f. What is the function of STC instruction? (CO3,K1) 1

(a) Store to C Register, the value of Accumulator

(b) Set Carry to 1

(c) Clear the Stack pointer

(d) Set SP to 1

1-g. What does the term "pin-muxing" refer to in the context of GPIO? (CO4,K1) 1

(a) Configuring a pin for multiple functions

(b) Combining multiple pins into one

(c) Using multiple pins for a single function

(d) Disabling unused pins

1-h. The AVR CPU core operates based on which architecture? (CO4,K1) 1

(a) RISC

(b) CISC

(c) VLIW

(d) Multithreading

1-i. Which PWM mode has a symmetric waveform, counting up and then down? (CO5,K1) 1

(a) Fast PWM

(b) Normal mode

(c) Phase Correct PWM

(d) CTC mode

1-j. What is the primary function of an Analog Comparator in ATmega328P? (CO5,K1) 1

(a) Compare two analog voltages

(b) Generate a digital signal

(c) Control the clock source

(d) Generate PWM signals

2. Attempt all parts:-

2.a. Define the base (radix) of a number system. Convert $(35.25)_{10}$ into binary number. (CO1,K2) 2

2.b. Give the comparison between combinational circuits and sequential circuits. 2

(CO2,K2)

2.c. List the 16 – bit registers of 8085 microprocessor. (CO3,K1) 2

2.d. Explain the role of the SRAM in ATmega 328P. (CO4,K2) 2

2.e. Define the purpose of Timer/Counters in ATmega328P. (CO5,K2) 2

SECTION-B 30

3. Answer any five of the following:-

3-a. Design a 2- bit magnitude comparator using gates. (CO1,K3) 6

3-b. What is Demultiplexer? Design 1 :16 demux using 1:4 demux. (CO1,K3) 6

3-c. Explain 4 bit Johnson counter with circuit diagram and waveforms. (CO2,K3) 6

3-d. Convert T flip-flop into D flip-flop. (CO2,K3) 6

3.e. Explain following signals of 8085. a) ALE b) READY c) INTR (CO3,K2) 6

3.f. Draw the architecture of the AVR CPU core of the atmega328P microcontroller. (CO4,K2) 6

3.g. Describe how fast PWM mode differs from phase-correct PWM mode. (CO5,K3) 6

SECTION-C 50

4. Answer any one of the following:-

4-a. Simplify the given function using K-map technique in SOP and POS forms: (CO1,K3) 10

$$F(w,x,y,z)=\sum m(0,1,7,8,9,10,12)+\sum d(2,5,15).$$

4-b. Design and explain carry look ahead adder. (CO1,K3) 10

5. Answer any one of the following:-

5-a. Draw & explain working of universal shift register. (CO2,K3) 10

5-b. Convert D and JK flip-flopes into T flip-flop. (CO2,K3) 10

6. Answer any one of the following:-

6-a. With the help of neat diagram explain the architecture of 8085 microprocessor in detail. Discuss its flag register. (CO3,K3) 10

6-b. Specify the contents of the A,B,C,D,E,H,L ,M registers as each if the following instructions is being executed. MVI C,FFH LXI H,2030H LXI D,7050H MOV M,C XCHG LDAX D HLT (CO3,K3) 10

7. Answer any one of the following:-

7-a. Draw the schematics of the PIN muxing and Internal Pull up resistor and discuss their requirements in brief. (CO4,K3) 10

7-b. Draw the block diagram of the ATmega328P microcontroller and explain each component in detail. (CO4,K3) 10

8. Answer any one of the following:-

8-a. Discuss about the ASSR and GTCCR register in detail. (CO5,K3) 10

8-b. Describe the working of SPI and IIC protocol? How they are used in atmega328P and how ther are differ from USART. (CO5,K3) 10