KUMARAGURU
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B.E DEGREE EXAMINATIONS: MAY 2017

(Regulation 2015)

Fourth Semester

MECHATRONICS ENGINEERING

U15MCT404: Digital Electronics and Microprocessor

COURSE OUTCOMES

CO1: Use number systems, Boolean algebra and explain various digital logic families.

CO2: Apply basic logic gates to form simple circuits and can simplify logic circuits using K- Map technique.

CO3: Design combinational logic circuits using logic Gates and explain simple memory systems.

CO4: Design flip flops and realize one flip flop using the other.

CO5: Design counters and construct their timing diagrams.

CO6: Explain the architecture of 8085 microprocessor and their peripheral ICs (8255, 8279 and 8251 A).

CO7: Write assembly language program for 8085 for the given application.

CO8: Explain the memory Mapping and I/O devices.

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1.   Matching type item with multiple choice code   CO1   [K2]

List I	List II
A. $(122)_8$	i. 1808
B. $(4AEF8)_{16}$	ii. 1414
C. $(10110000110)_2$	iii. 82
D. $(3420)_8$	iv. 306936

	A	B	C	D
a)	ii	i	iii	iv
b)	iii	iv	ii	i
c)	ii	iv	iii	i
d)	iii	i	ii	Iv

2. A group of 4 adjacent 1's in a K-map is called   CO2 [K$_1$]

   a) Nibble   b) Quad

   c) Octet   d) Pairs

3. Indicate which of the following logic gates can be used to realizes all possible combinational   CO3 [K$_2$]

   logic functions

      1. OR Gates only

      2. NAND gates only

      3. EX-OR gates only

      4. NOR gates only

   a) 1,3   b) 1,4

   c) 1,2   d) 2,4

4. How many Flip-Flop are required for mod-16 counter   CO4 [K$_2$]

   a) 5   b) 6

   c) 3   d) 4

5. Assertion (A): State machine is a synchronous circuit   CO5 [K$_2$]

   Reason (R): In Moore machine, the output is a function of present state

   a) Both A and R are Individually true and   b) Both A and R are Individually true but
      R is the correct explanation of A   R is not the correct explanation of A

   c) A is true but R is false   d) A is false but R is true

6. The 8279 programmable keyboard / display interface is   CO6 [K$_1$]

   a) 40 Pin Device   b) 20 Pin Device

   c) 30 Pin Device   d) 45 Pin Device

7. There are different types of memory   CO8 [K$_2$]
   1. RAM
   2. ROM
   3. PROM
   4. EEPROM
   Order in terms of number of switches used in construction of these memories.

   a) 2-3-4-1   b) 1-3-2-4

   c) 3-4-2-1   d) 4-1-3-2

8. MVI C,50 belongs to _____ addressing mode   CO7 [K$_1$]

   a) Immediate   b) Direct

   c) Implied   d) Register Indirect

9. Assertion (A): Microprocessor places the 16 bit address on the address bus   CO8 [K$_2$]

   Reason (R): Microprocessor sends a pulse called Memory Read as the control signal

   a) Both A and R are Individually true and   b) Both A and R are Individually true but
      R is the correct explanation of A   R is not the correct explanation of A

   c) A is true but R is false   d) A is false but R is true

10. When a subroutine is called, the address of the instruction following the CALL instruction is   CO7 [K$_2$]
    stored in the

    a) Stack Pointer   b) Accumulator

    c) Program Counter   d) Stack

PART B (10 x 2 = 20 Marks)
(Answer not more than 40 words)

11. Subtract 1101101 from 10110 using 1's complement   CO1 [K$_2$]
12. List down rules of simplification for karnaugh maps.   CO2 [K$_1$]
13. List out the classification of combinational logic.   CO3 [K$_1$]
14. How is a J-K flip-flop made to toggle?   CO4 [K$_3$]
15. Draw a typical 3 bit ripple counter's state diagram.   CO5 [K$_1$]
16. List the functions performed by 8255 Chip.   CO6 [K$_1$]
17. Compare CALL and PUSH instruction.   CO7 [K$_2$]
18. Write an assembly language program to add two numbers of 8 bit length.   CO7 [K$_3$]
19. What is meant by address mapping?   CO8 [K$_2$]
20. List the I/O mode in 8255.   CO6 [K$_2$]

Answer any FIVE Questions:-
PART C (5 x 14 = 70 Marks)
(Answer not more than 300 words)

Q.No. 21 is Compulsory

21. a. Perform the subtraction of 101010 - 1111 using 2's complement   (4)   CO1 [K$_3$]

    b. convert each pair of decimal number to BCD and add   (10)   CO1 [K$_3$]

        i)$(65)_{10} + (58)_{10}$

        ii)$(113)_{10} + (101)_{10}$

22. Using k-map method obtain the minimal SOP and POS expressions for the function (14) CO2 [K$_2$]
F(x,y,z,w) = $\sum$ (1,3,4,5,6,7,9,12,13)

23. Design and construct a 4-bit carry look ahead adder. (14) CO3 [K$_3$]

24. i) Realize D flip flop using SR flip flop (4) CO4 [K$_2$]
    ii) Explain the construction of clocked SR flip flop with truth table. (10) CO4 [K$_3$]

25. Design and construct a asynchronous decade counter. Implement the design using JK CO5 [K$_3$]
flip-flop

26. Explain the architecture of 8085 with block diagram CO6 [K$_2$]

27. Interface two numbers of 16 KB EPROM and one number of 8 KB RAM with 8085 CO8 [K$_3$]
microprocessor using memory mapped I/O.

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