KUMARAGURU
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B.E DEGREE EXAMINATIONS: MAY 2018

(Regulation 2015)

Fourth Semester

MECHATRONICS

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 [K_2]

List I	List II
A. $(X + Y)(X + Z)$	i. $(231)_8$
B. $(153)_{10}$	ii. $(734)_8$
C. $(1 D C)_{16}$	iii. $X+YZ$
D. $X + (Y + Z)$	iv. $(X + Y) + Z$

	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. The digital logic family which has minimum power dissipation is   CO1 [K₂]

a) TTL   b) DTL

c) RTL   d) CMOS

3. Consider the following registers: CO6 [K₂]

1. Accumulator and flag register

2. B and C register

3. D and E register

4. H and L register

Which of these 8-bit registers of 8085 microprocessor can be paired together to make a 16-bit register?

a) 1,2,3   b) 3,4

c) 2,3,4   d) 1,2,3

4. If $F(A, B, C) = \Sigma(1,3,5)$, then $\bar{F}(A, B, C)$ CO2 [K₂]

a) $\Pi(1,3,5)$ b) $\Pi(0,2,4,6,7)$

c) $\Sigma(1,3,5)$ d) $\Sigma(0,2,4,6,7)$

5. Assertion (A): A flip-flop or latch is a circuit that has two stable states   CO5 [K₂]

Reason (R): A flip-flop is a device which stores a single bit of data

a) Both A and R are Individually true and R is the correct explanation of A   b) Both A and R are Individually true but 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. For JK flipflop J = 0, K=1, the output after clock pulse will be   CO4 [K₂]

a) no change   b) high impedance

c) 1   d) 0

7. Consider the following statements.   CO3 [K₂]

1. State the problem.

2. Assign letter symbols for input and output variable.

3. Obtain simplified Boolean function for each output and draw the logic circuit.

4. Determine the input variables and required output variables.

5. Draw the truth table that defines the required relation between inputs and outputs.

The correct sequence of steps involved in designing a combinational circuit are

a) 1-4-2-5-3   b) 1-2-3-4-5

c) 1-4-3-5-2   d) 2-1-3-5-4

8. The following switching functions are to be implemented using a Decoder: CO3   [K$_3$]

f1= Σm(1, 2, 4, 8, 10, 14)

f2 = Σm (2, 5, 9, 11)

f3=Σ m (2, 4, 5, 6, 7)

The minimum configuration of the decoder should be

a) 2 – to – 4 line.   b) 4 – to – 16 line.

c) 3 – to – 8 line.   d) 5 – to – 32 line

9. How many address bits are required to represent a 32 K memory   CO8   [K$_2$]

a) 15 bits.   b) 12 bits

c) 14 bits   d) 16 bits

10. MOV B,C is a _____ byte instruction.   CO7   [K$_2$]

a) 1   b) 2

c) 3   d) 4

PART B (10 x 2 = 20 Marks)

(Answer not more than 40 words)

11. Find the canonical SOP for the function f (A, B, C) = A + BC   CO2   [K$_2$]

12. Reduce the boolean expression :   CO1   [K$_2$]

   i) AB+BB+C+B'

   ii) Y=RST+RS+(T'+V)

13. Distinguish between combinational circuit and sequential logic circuit.   CO4   [K$_2$]

14. Implement the following functions using ROM   CO3   [K$_3$]

F1 = Σ (0, 2)

F2 = Σ (1,2, 3)

15. Sketch the 3 bit SISO shift register using D flip flop.   CO5   [K$_2$]

16. Define flipflop.   CO4   [K$_2$]

17. What are the types of data transfer schemes in 8085?   CO8   [K$_2$]

18. List the addressing modes of 8085 microprocessor.   CO6   [K$_2$]

19. What is opcode fetch cycle?   CO7   [K$_2$]

20. Mention the functions performed by 8279.   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) Obtain minimal expression for the following function and implement it in Universal logic

CO2 [K₂]

$F = \Sigma m (0,1,9,15,24,29,30) + d(8,11,31)$

22. Design a combinational circuit to convert Binary number to gray code.

CO3 [K₂]

23. i) Design a half subtractor. (4)

CO3 [K₂]

ii) Implement the function $F(A,B,C,D) = \square m (0,1,3,4,8,9,15)$ using 8 to 1 (10) multiplexer.

24. i) Design a circuit to Convert JK flip flop into D flip flop. (10)

CO4 [K₂]

ii) Write an assembly language program to subtract the contents of memory location (4) 4001H from the memory location 4000H and place the result in memory location 4200H.

CO7 [K₂]

25. Design a 3 bit synchronous up counter.

CO5 [K₂]

26. Elucidate the architecture of 8085 microprocessor.

CO6 [K₂]

27. Interface two numbers of 8KB EPROM and one number of 4KB RAM with 8085 Microprocessor. Explain the interface diagram and allocate binary addresses to memory ICs.

CO8 [K₃]

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