K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE - 560109
DEPARTMENT OF ARTIFICAL INTELLIGENCE AND DATA SCIENCES
SESSION: 2022-2023 (ODD SEMESTER)

FIRST ASSIGNMENT

Degree	:	B.E	Semester	:	III
Branch	:	AI&DS	Course Code	:	21CS33
Course Title	:	Analog and Digital Electronics	Max Marks	:	10
Date	:	29/11/2022	Last Date for submission	:	/12/2022

Q No.	Question	Marks	K-Level	CO mapping
1	**Identify** all the prime implicants and essential prime implicants for the following Boolean function and obtain minimum sum of product using K-map F(a,b,c,d)=∑m(1,2,3,5,6,7,11,12,13,14,15)	1	Applying K3	CO1
2	**Find** the minimal sum of product and product of sum for the following Boolean function using K-map F(a,b,c,d)= ∑m(6,7,9,10,13)+d(1,4,5,11)	1	Applying K3	CO1
3	**Solve** the following Boolean function by using a Quine-McClusky method F(a,b,c,d)= ∑m(0,2,3,6,7,8,10,12,13) F(a,b,c,d)= ∑m(1,2,3,5,9,12,14,15)+d(4,8,11)	1	Applying K3	CO1
4	A digital system is to be designed in which months of the year is given as input in four-bit form. The month January is represented as '0000', February as '0001 and so on. The output of the system should be '1' corresponding to the input of the month containing 31 days or otherwise it is '0'. Consider the excess number in the input beyond '1011' as don't care conditions for the system of four variables (A, B,C,D) **find** the following i. Write the Boolean expression in ∑m and πM form. ii. Write the truth table. iii. Using K-Map, simplify expressions of canonical minterm form. Implement the simplified equation using NAND-NAND gates.	1	Applying K3	CO1

6	**What** are the advantages of Map-Entered Variable method? Using MEV method **solve** following function: F (A, B, C, D) = $m_0+m_2+m_3+Em_5+Em_7+Fm_9+m_{11}+m_{15}$ +d (1,13,14) F (A, B, C, D) = $\sum$m (1,3,13,15) +d (8,9,10,11)	1	Applying K3	CO1
7	**Find** the minimum SOP and POS for each function using a karnaugh map and give the circuit diagram f (A, B, C, D) = Σm (0,1,2,4,5,12,14) + d (8,10). f (A, B, C, D) =ΠM (0,2,3,8,9,12,13,15)	1	Applying K3	CO1
8	**Define static 1** hazard. **Explain** how static-1 hazard can be detected and removed with an example.	1	Applying K3	CO2
9	**Define** static 0 hazard. Detect and eliminate static 0 hazard in the function the f (A, B, C) =ΠM (0,1,3,4)	1	Applying K3	CO2
10	Explain Petrik's method with an example	1	Applying K3	CO1

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SESSION: 2022-2023 (ODD SEMESTER)

SECOND ASSIGNMENT

Degree	: B.E	Semester	: III
Branch	: AI&DS	Course Code	: 21CS33
Course Title	: Analog and Digital Electronics	Max Marks	: 10
Date	: /1/2023	Last Date for submission	: /12/2022

Q No.	Question	Marks	K-Level	CO mapping
1	What is multiplexer? **Implement** the given Boolean functions by using 8:1 multiplier. i) F(a,b,c,d)=∑m(0,1,3,5,7,11,12,13,14) ii)F(a,b,c,d)=∑m(0,1,5,6,8,10,12,15) iii)F(a,b,c,d)=πM(1,2,5,6,9,12)	1	Applying K3	CO2
2	**Explain** the working principal of 3:8 decoder. **Implement** the given Boolean function using 3:8 decoder and external gates. F1(a,b,c))=∑m(0,4,6), F2(a,b,c)=∑m(0,5) F3(a,b,c)=∑m(1,2,3,7)	1	Applying K3	CO2
3	a)**Implement** the following multi-Boolean function using 3×4×2 PLA F1(a,b,c)= ∑m(1,2,4,6), F2(a,b,c)=∑m(0,1,6,7) F3(a,b,c)=∑m(2,6) b)**Implement** the following multi-Boolean function using appropriate PLA F1(a,b,c)= ∑m(0,4,7), F2(a,b,c)=∑m(4,6)	1	Applying K3	CO2
4	a) **Design** full adder using PAL. b)**Implement** the following Boolean function using appropriate PAL A(x,y,z)= ∑m(1,2,4,6), B(x,y,z)=∑m(0,1,6,7) C(x,y,z)= ∑m(2,6)	1	Applying K3	CO2
5	Discuss three state buffers and its types.	1	Understanding K2	CO2

6	Explain the structure of VHDL program and **implement** full adder using VHDL code	1	**Applying K3**	CO3
7	a)Differentiate between latches and flip-flop b) Explain Master/Slave JK flip-flop using NAND gate with suitable timing diagram.	1	**Understanding K2**	CO3
8	**Derive** the characteristics equation and excitation table for the following flip-flops a)SR flip-flop b)JK flip-flop c) D flip-flop d) T flip-flop	1	**Applying K3**	CO3
9	Explain JK flip-flop and T flip-flop with timing diagram	1	**Understanding K2**	CO3
10	Explain the working of SR gate latch and D gate latch using NAND gates and **derive** the characteristics equation for the same.	1	**Applying K3**	CO3

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DEPARTMENT OF ARTIFICAL INTELLIGENCE AND DATA SCIENCES
SESSION: 2022-2023 (EVEN SEMESTER)

FIRST ASSIGNMENT

Degree	: B.E	Semester	: IV
Branch	: AI&DS	Course Code	: 21CS43
Course Title	: Microcontroller & Embedded systems	Max Marks	: 10
Date	: /06/2023	Last Date for submission	: /06/2023

Q No.	Question	Marks	K-Level	CO mapping
1	Differentiate between i) RISC and CISC. ii) Microprocessor and Microcontroller iii) Von-Neuman architecture and Harvard architecture	1	Understanding K2	CO1
2	i) Explain ARM core data flow model with neat diagram ii) Explain architecture of a typical embedded device based on ARM, with neat diagram. iii) Explain pipelining with a neat diagram iv) Explain different processor modes provided by ARM.	1	Understanding K2	CO1
3	Explain ARM registers used under various modes	1	Understanding K2	CO1
4	Explain the various fields in the current program status register.	1	Understanding K2	CO1
5	Discuss ARM core extension with a neat diagram i)Cache and tightly coupled memory	1	Understanding K2	CO1
6	Briefly describe the concepts of exceptions, interrupts, and the vector table	1	Understanding K2	CO1
7	i) Write an ALP using ARM instructions to find the factorial of a given number. ii) Write an ALP using ARM instructions to find sum of 1st 10 integer numbers	1	Understanding K2	CO2

8	With an example, explain the following ARM instructions i)MOV ii)MVN iii)ADC iv)RSC v)BIC vi)SBC vii) EOR viii)RSB	1	Understanding K2	CO2
9	What are the various logical instructions supported by ARM? Explain with examples for each.	1	Understanding K2	CO2
10	With a neat diagram explain barrel shifter.	1	Understanding K2	CO2

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DEPARTMENT OF ARTIFICAL INTELLIGENCE AND DATA SCIENCES
SESSION: 2022-2023 (EVEN SEMESTER)

SECOND ASSIGNMENT

Degree	: B.E	Semester	: III
Branch	: AI&DS	Course Code	: 21CS43
Course Title	: Microcontroller & Embedded systems	Max Marks	: 10
Date	: /08/2023	Last Date for submission	: /08/2023

Q No.	Question	Marks	K-Level	CO mapping
1	Briefly explain the different load-store instruction categories used in ARM.	1	Understanding K2	CO2
2	Explain Co-processor instructions in ARM.	1	Understanding K2	CO2
3	Discuss load and store instructions with respect to i) Single register transfer ii) Multiple register	1	Understanding K2	CO2
4	Explain i) Branch instructions in ARM. ii) Multiply instructions iii) Load constants	1	Understanding K2	CO2
5	i) Write a note on instruction scheduling. ii) Summarize scheduling of load instructions.	1	Understanding K2	CO2
6	Write a C program that prints squares of the integers between 0 to 9 using function and explain how to convert C function to assembly function.	1	Understanding K2	CO3
7	Write a note on profiling and cycle counting	1	Understanding K2	CO3
8	With a short note on i) Register allocation ii) Allocation variables to register numbers	1	Understanding K2	CO3
9	Write an ALP to count the number of ones and zeros in two consecutive memory locations.	1	Understanding K2	CO3

10	i) Write an ALP using ARM instructions to find the largest/smallest number in an array with 32 bit data. ii) Write an ALP using ARM instructions to arrange the number in ascending/descending order.	1	Understanding K2	CO2
11	Explain the following instructions with syntax and example i) SWI ii)SWP iii)MSR iii)MRS	1	Understanding K2	CO2
12	Explain the most efficient way to write a **for** loop on the ARM with checksum example. (Consider the fixed number of iterations)		Understanding K2	CO3
13	Explain loop unrolling with an example.		Understanding K2	CO3

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SESSION: 2022-2023 (EVEN SEMESTER)

FIRST ASSIGNMENT

Degree	:	B.E	Semester	:	IV
Branch	:	AI & DS	Course Code	:	21CS44
Course Title	:	Operating Systems	Max Marks	:	10
Date	:	13/06/2023	Last Date for submission	:	20/06/2023

Q No.	Questions	Marks	K-Level	CO mapping
1	a. **Explain** computer system operations with diagram. b. **Explain** operating system operations with diagram.	1	Understanding K2	CO1
2	a. **Define** an operating system. **Illustrate** with neat diagram. b. **Explain** briefly about types of system calls.	1	Understanding K2	CO1
3	a. **Define** a process **illustrate** with a neat diagram the different states of a process and process control block. b. List and **explain** the services provided by the OS for the user and efficient operation of system.	1	Understanding K2	CO1
4	a. **Explain** Multiprogramming and Time-sharing systems **b. Explain** 1) Single processor systems 2) Multiprocessor systems 3) Clustered systems	1	Understanding K2	CO1
5	a. **Explain** Microkernel and Module structure of operating system. b. **Explain** the concept of virtual machines with neat diagram. Bring out its advantages.	1	Understanding K2	CO1
6	a. **Compare** client – server computing and peer-to-peer computing. b. **Demonstrate** the operation of process creation and process termination in UNIX.	1	Understanding K2	CO1
7	a. **Explain** layered approach structure of operating system. b. **Describe** the implementation of IPC using shared memory and message passing.	1	Understanding K2	CO1
8	a. **Explain** different types of multi-threading models. b. **Explain** preemptive and non-preemptive scheduling.	1	Understanding K2	CO2

9	**Build** the Gantt chart and **calculate** average waiting time and turnaround time for the following snapshot of the process using FCFS and Round Robin. Process ID | Arrival Time | Burst Time P1 | 0 | 2 P2 | 3 | 6 P3 | 4 | 1 P4 | 5 | 4	1	Applying K3	CO2
10	a. **Build** the Gantt chart and **calculate** average waiting time and turnaround time for the following snapshot of the process using SRTF and Priority scheduling algorithms. Process ID | Arrival Time | Burst Time P1 | 0 | 2 P2 | 3 | 6 P3 | 4 | 1 P4 | 5 | 4 b. **Build** Gantt chart to show execution of Preemptive SJF and non-preemptive SJF and **Calculate** average waiting time and average turnaround time. Process ID | Arrival Time | Burst Time P1 | 0 | 10 P2 | 2 | 6 P3 | 3 | 3 P4 | 4 | 4	1	Applying K3	CO2

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DEPARTMENT OF ARTIFICIAL INTELIGENCE & DATA SCIENCE

SESSION: 2022-2023 (EVEN SEMESTER)

SECOND ASSIGNMENT

Degree	:	**B.E**	**Semester**	:	**IV**
Branch	:	**AI&DS**	**Course Code**	:	**21CS44**
Course Title	:	**Operating Systems**	**Max Marks**	:	**10**
Date	:	**21/07/2023**	**Last Date for submission**	:	**31/07/2023**

Q No.	Questions	Marks	K Level	CO Mapping
1.	a) **Explain** critical section and requirements that critical section problem must satisfy. b) **Define** Semaphores. **Explain** two primitive Semaphore operations. **Discuss** its advantages and disadvantages.	1	Understanding K2	CO2
2.	a) **Illustrate** Peterson's solution for critical section problem. b)**Explain** solution to Bounded-Buffer Problem using Semaphores.	1	Understanding K2	CO2
3.	**Define** Semaphores. **Explain** Reader-Writer problem with semaphore in detail.	1	Understanding K2	CO2
4.	**Define** Monitors. **Explain** Dining-Philosophers solution using Monitors.	1	Understanding K2	CO2
5.	a) **Define** deadlock? **Explain** the necessary conditions for deadlock occurrence. b) **Draw** and **Explain** the Resource-Allocation Graph i) With deadlock ii) With a cycle but no deadlock	1	Understanding K2	CO3
6.	**Find** the safe sequence for the following snapshot by using Banker's algorithm. i)Is the system is in safe state? ii) If a request from process P2 arrives for (0,0,2) can the request be granted?	2	Applying K3	CO3

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P0	0	0	2	0	0	4	1	0	2
P1	1	0	0	2	0	1			
P2	1	3	5	1	3	7			
P3	6	3	2	8	4	2			
P4	1	4	3	1	5	7			

7.	**Explain** deadlock detection with algorithm and example.	**2**	**Understanding K2**	**CO3**
8.	**Determine** whether the following system is in safe state by using Banker's algorithm. If a request for P1 arrives for (1,0,2), can the request be granted immediately?	**2**	**Applying K3**	**CO3**
9.	a) **Define** Translation Load aside Buffer (TLB). **Explain** TLB in detail with a simple paging system with a neat diagram. b) **Explain** segmentation with example.	**2**	**Understanding K2**	**CO3**
10.	a) **Discuss** both external and internal fragmentation problems encountered in a contiguous memory allocation scheme. b) **Explain** the structure of page table with respect to hierarchical paging.	**2**	**Understanding K2**	**CO3**

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P0	0	1	0	7	5	3	3	3	2
P1	2	0	0	3	2	2			
P2	3	0	2	9	0	2			
P3	2	1	1	2	2	2			
P4	0	0	0	4	3	3			

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