

JK Lakshmipat University Jaipur
INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular/Backlog), Nov 2022

BCA, Semester I

Roll No.....

CS1117: Computer Organisation and Systems

Time: 3 hours

Max. Marks: 60

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.
4. Use of Programmable Calculator is not allowed.

Q.1A	Convert the following as instructed: a) $(1234)_{10}$ to Hexadecimal. b) $(675)_8$ to Hexadecimal c) $(1FB)_{16}$ to Decimal.	03 (CO9)
Q.1B	Draw the minimized gate level circuit using 2 input AND, 2 input OR and inverters for the following function (use Boolean Algebra): $AB + ABC + A'B + AB'C$	03 (CO2)
Q.1C	Minimize the given function using Karnaugh Map. $F(A,B,C) = AB'C + A'BC + BC + AB$	02 (CO2)
Q.2A	Write the following a) -123.5 in single precision IEEE representation b) 64.25 in double precision IEEE representation.	02+01 (CO5)
Q.2B	Multiply 23 with -25 using Binary representation of numbers. (show the working steps)	02 (CO2)
Q.3	Write the control signals using single bus CPU organization for instruction. Add A, [A], B ; Add the contents of Register B to the contents of location pointed by Register A and Store the result in the Register A.	03 (CO1)

Q.4	Consider a Pipeline with 4 stages S1, S2, S3, S4 with execution times 1ms, 2ms, 1ms, 2ms. Consider four instructions I1, I2, I3, I4 which use these stages as following: I1: S1 S3 S4 I2 : S1 S2 S3 S4 I3 : S1 S2 S4 I4 : S1, S2, S3 a) Calculate the total time taken to execute these instructions serially (in order I1, I2, I3, I4) if there was no pipelining. b) Calculate the total time taken for a) with the pipelining. Draw the Time-space diagram for the execution of 4 instructions. Assume that there is no data dependency among the instructions. (Hint: consider structural hazards)	02+06 (CO6)
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Q.5	Consider a disk with 16 surfaces, 100 tracks/surface, 100 sectors per track and 256 bytes per sector. The disk rotates at 500 RPM. Calculate a) - Total disk capacity - Average Latency b) Find total time taken in servicing all requests if the tracks (numbered 0-99) are requested in the following sequence: 0,10 15, 25, 18,90, 35,75, 63, 10 using (a) FCFS (Head is on track 0) (b) SSTF (Head is on track 0) (c) SCAN (Head is on track 30 and going towards 40) (assume that the head takes 1ms to move from one track to neighboring track)	02+06 (CO1)
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Q.6	For each statement below, indicate if it is true or false. Remember that there is a negative marking in this question. Each correct reply gives you 1 mark and each wrong answer will give you -1 mark. (Minimum mark for the question is 0). a) RAM is volatile. b) ROM is volatile. c) SRAM needs periodic refreshing. d) Microprogrammed control is faster than Hardwired control.	08 (CO1 to CO9)
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	e) There are two representations of 0 in 2's complement representation of an integer. f) Shortest Seek Time algorithm may lead to starvation. g) Any Memory block can be stored in any Cache block in Set Associative Cache organization. h) Some interrupts can not be masked.	
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Q.7	Consider the main memory have three cache blocks (0,1,2) and fully associative cache memory architecture. Processor requires the pages from the in the following order 6, 7, 8, 9, 6, 7, 1, 6, 7, 8, 9, 1. Show the implementation of FIFO, LRU and MRU. Also calculate Hit ratio in each case.	08 (CO7, CO8)
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Q.8	a) Explain the following instruction using suitable example. Also show the role of Flag register if required. - LOOP - JNC - JZ b) Explain DAA (Decimal Adjust after Addition) instruction using suitable example.	03+03 (CO3)
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Q.9	What will be the value of BL and Carry Flag after execution a), b) and c). Also show your working steps. a) MOV BL, 33H MOV CL, 01H SHR BL, CL b) MOV BL, 42H MOV CL, 02H ROL BL, CL c) MOV BL, 33H MOV AL, 0FFH ADD BL, AL	02+02 +02 (CO4)
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