Reg. No.											

MANIPAL UNIVERSITY
SCHOOL OF INFORMATION SCIENCES

FIRST SEMESTER MASTER OF ENGINEERING – **ME** (EMBEDDED SYSTEMS) /
THIRD SEMESTER M.Sc. Tech (EMBEDDED SYSTEMS)
DEGREE EXAMINATION – APRIL / MAY 2016

SUBJECT: ESD 607 – COMPUTER ARCHITECTURE

Tuesday, May 3, 2016

Time: 10.00 – 13.00 Hrs. Max. Marks: 100

1. Design a synchronous counter to sequence 0, 1, 4, 6, 7, 5, 0 using D flip flop (10 marks)

2. The instruction repertoire of a computer consists of 8 instructions I0, I1, …., I7. The relative frequency of these instructions are as follows

Instruction	Relative Frequency
I0	1/4
I1	1/8
I2	1/8
I3	1/8
I4	1/8
I5	1/8
I6	1/16
I7	1/16

'Encode these instructions using Huffman's method. Calculate the redundancy introduced by 'Huffman's method. (10 marks)

3. Design a 4 stage Carry Look Ahead Circuit in terms of Carry Propagate and Carry Generate functions and also give the register level organization for a 4 bit CLA . (10 marks)

4. Show the implementation of an ALU to satisfy the following truth table. Assume that X and Y are 4-bit numbers

S1	S0	Output Z
0	0	X plus Y
0	1	X plus Y' plus 1
1	0	X AND Y
1	1	X Ex-OR Y

(10 marks)

5. For the reservation table shown in fig Q.5 find the following
(a) List of forbidden latencies (b) Collision vector (c) State diagram showing all possible latency cycles
(d) List of all simple cycles (e) Minimum Average Latency (MAL)

	0	1	2	3	4	5	6	7	8
S1	X								X
S2		X	X					X	
S3				X					
S4					X	X			
S5							X	X	

Fig. Q.5

(1+1+6+1+1 = 10 marks)

6. Design control circuit for a coffee vending machine which accepts one rupee coin and gives coffee for rupees three. Draw (a) state diagram (b) state table (c) minimize the logic (d) draw the final circuit.
(2+2+4+2 = 10 marks)

7. Explain the following operating modes in ARM7 Processor
   A. Interrupt Request
   B. Supervisor
   C. Undefined

(3+4+3=10 marks)

8. Explain the following instruction with an example
   A. LDMIA R1 !, { R3 –R7 }
   B. BIC R0 ,R1
   C. BLX R0
   D. TEQ R0, R1
   E. CDP CP ADDEQ R0,R1,R2

(2x5 = 10 marks)

9. Briefly explain the features of ARM 9 TDMI Processor and also mention about ARM 920T organization with suitable diagram

(7 + 3 = 10 marks)

10. Briefly Explain the AMBA APB bus with suitable block diagram

(10 marks)

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