Reg. No.										

MANIPAL UNIVERSITY
SCHOOL OF INFORMATION SCIENCES

FIRST SEMESTER MASTER OF ENGINEERING – **ME** (EMBEDDED SYSTEMS)
DEGREE EXAMINATION (MAKE-UP) – JULY 2016

SUBJECT: **ESD 607 – COMPUTER ARCHITECTURE**

Friday, July 15, 2016

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

1. Find the minimal solution for the following
   $F(A,B,C,D,E) = \sum m\ (0,1,4,5,16,17,21,25,29)$

   (10 marks)

2. Design a 4 - bit arithmetic functions as follows

S2	S1	S0	Functions
0	0	0	A
0	0	1	A + B
0	1	0	A + B'
0	1	1	A – 1
1	0	0	A + 1
1	0	1	A + B + 1
1	1	0	A + B' + 1
1	1	1	A

   (10 marks)

3. Explain the implementation of a 4-bit carry propagate adder. Explain how a 16-bit adder can be implemented using the above 4-bit adder.

   (10 marks)

4. Explain the 3 internal forwarding techniques with suitable example & apply the same for the following sequence of instruction to obtain one instruction using the graphical representation.

   R0 ⟵ (M1)
   R0 ⟵ (R0) + (M2)
   R0 ⟵ (R0) * (M3)
   M4 ⟵ R0

5. (a) Modify the reservation table in Fig Q.5 to get the optimum performance & find
   (b) List of forbidden latencies (c) Collision vector
   (d) State diagram showing all possible latency cycles
   (e) Minimum Average Latency (MAL)

	0	1	2	3	4
S1	X				X
S2		X		X	
S3			X		X
S4				X	

Fig.Q.5

(3+1+1+4+1 = 10 marks)

6. (a) Explain with suitable block diagram functioning of a micro programmed control unit.
   (b) List out benefits of micro programmed control unit over hard wired control unit.

(8+2= 10 marks)

7. Briefly mention features of RISC architecture included in ARM processors and also mention enhancements in ARM processor in order to make it suitable for Embedded applications

(6+4 =10 marks)

8. List and explain the various Data Processing Instructions in the ARM architecture

(10 marks)

9. Explain the Control Flow Instructions in ARM with relevant example.

(10 marks)

10. Briefly explain the Exceptions and Interrupts supported by ARM 7 processor and also comment on Exception handler to service Exceptions and interrupts

(7 + 3= 10 marks)

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