Reg. No.										

MANIPAL UNIVERSITY
SCHOOL OF INFORMATION SCIENCES

THIRD SEMESTER M.Sc. Tech (EMBEDDED SYSTEMS & INSTRUMENTATION)
DEGREE EXAMINATION – NOVEMBER 2017

SUBJECT: ESI 605 – EMBEDDED SYSTEMS DESIGN

Saturday, November 18, 2017

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

Answer ALL the questions

1. For a product, the NRE cost and unit cost are shown in the table for three listed IC Technologies:

Technology	NRE Cost in Rs	Unit Cost in Rs
FPGA	5,000	25
ASIC	50,000	10
VLSI	300,000	5

Determine the precise volumes for which each technology yields the lowest total cost.
(10 Marks)

2. Design a combinational circuit for the given problem. Write the truth table, minimize using K map and realize the circuit using basic gates.
Y is 1 if A is 1, or B and C are 1. Z is 1 if B or C is 1, but not both (or, A, B and C are all 1).
(10 Marks)

3. Explain the typical development environment of an embedded system bringing out the software and hardware environment and debug process.
(10 Marks)

4. Given an analog input signal whose voltage ranges from 0 to 10V, and an 8-bit digital encoding, calculate the correct encoding for 4.3V, and then trace the successive approximation method (i.e. list all the guessed encodings in the correct order) to find the correct encoding.
(10 Marks)

5. Discuss each stage design considerations of a 4 input Data Acquisition System with a suitable figure.

(10 Marks)

6. Explain a typical address translation scheme in a segmentation system. What happens if the address range is more than the segment length?

(10 Marks)

7. A virtual memory system has the following specifications
   - Size of the virtual address space = 64K
   - Size of the physical address space = 4K
   - Page size = 512

From the page table the following mapping is recognized

Virtual page number	Physical page frame number
0	0
3	1
7	2
4	3
10	4
12	5
24	6
30	7

Find all virtual addresses that will generate a page fault

(10 Marks)

8. Assume a main memory has 3-page frames and initially all page frames are empty. Consider the following stream of references
   2,3,2,5,6,2,4,6,1,4,6
   Calculate the hit ratio if the replacement policy used is
   a) FIFO (b) LRU (c) Optimal replacement policy.

(3+3+4=10 Marks)

9. List out (a) functional (b) non-functional requirements of digital camera. Write the **functional block diagram** specification and explain the need for such functionality.

(4+6=10 Marks)

10. Write a note on (a) Serial communication (b) Wireless communication.

(5+5=10 Marks)

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