POKHARA UNIVERSITY

Level: Bachelor Semester: Fall Year : 2018
Programme: BE Full Marks: 100
Course: Computer Organization and Architecture Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Describe about ISA. What are the considerations to be made while ISA design? 5
   b) A computer has a CPU with 8 bit address bus and 16 bit data bus. The computer uses isolated I/O. It has a 64 x 16 of ROM at 00 H; constructed using two 32 x 16 ROM Chips. It also has a 32 x16 of RAM at C0 H. The system has an Input device at 17H and an Output Device at B5H. Show the design for the system including all the required logic 10
2. a) List out the RTL Codes for Arithmetic and Logical Operations. Also show the implementation of addition and subtraction using parallel adder. 5
   b) Write a VHDL code for generating the combinational circuit with three inputs A, B and C and an output F, where F (A, B, C) = $\sum$ (1, 3, 6, 7). 5
   c) Write down the RTL Code for Booth's Algorithm. 5
3. a) There is a Very simple CPU for the given set of Instructions: 8

Instruction	Instruction Code	Operations
STA	00 AAAAAA	M[AAAAAA}←AC
XNOR	01 AAAAAA	AC←AC⊙M[AAAAAA]
JMP	10 AAAAAA	GOTO AAAAAA
SKIP	11 XXXXXX	PC←PC+1

   Let the instruction width be 8 bits and address is 6 bits. Design the CPU's Register Section, State Diagram and ALU.
   b) Design the hardwired control unit for the CPU described in question 3 a. 7

4. a) Design a microsequencer control unit with horizontal microcode for the CPU described in question 3 b. 8
   b) What is Lookup ROM? Describe in brief demonstrating a Lookup ROM working as XOR Gate. 7
5. a) What is Memory Hierarchy? Describe the Significance of Cache and Virtual Memory. 7
   b) What is Register Windows? In a system, there are 5 windows of registers, each register share 4 input registers, and 4 output registers. Each of the windows has 10 local registers. The system has 20 Global registers. Calculate the total number of registers in the system. Show the pictorial representation as well. 8
6. a) Differentiate between: 8
      i. Interrupt driven I/O and Programmed I/O
      ii. Vectored and Non Vectored Interrupt Hardware
   b) What is paging? What is page table? How is page table used to convert logical address to physical address? Illustrate. 7
7. Write short notes on: **(Any two)** 2×5
   a) Multi-byte Data
   b) BCD Addition
   c) DMA