Total nos. of printed pages: 2

Roll No: | | | | | | | | | | |

PRANVEER SINGH INSTITUTE OF TECHNOLOGY KANPUR

Odd Semester Session 2022-23 CT -I

B. Tech. III Semester

Computer Organization and Architecture (KCS-302)

CO Number	Course Outcome (Please include all COs of your Course here)
CO1	Able to define **[1.Remember]** and relate**[1.Remember]** the various components of digital system, register, bus architecture, addressing mode , pipelining and interrupt types with digital system.
CO2	Able to describe **[2.Understand]** and discuss **[2.Understand]** the ALU and its micro operation, instruction format, instruction cycle, hardwired and microprogrammed control and various modes of data transfer.
CO3	Able to apply **[3. Apply]** & calculate **[3. Apply]** various arithmetic operation techniques using different hardware algorithms.
CO4	Able to differentiate **[4. Analysis]** and categorise **[4. Analysis]** various memory such as cache memory, auxiliary memory and virtual memory.

Time: 1.5 Hrs. M. M. 15

Section A

Q1. Attempt all questions: **(1X3 = 3 Marks)**

a) Define Stack and list the major operations performed in Stack organization of CPU. CO1

b) Define control word. Specify the control word of the following micro-operations: CO1
   i) R6← R6 +1
   ii) R4← shr R7

c) Let SP =0000000 in the stack. How many items are there in the stack if : CO2
   i) FULL = 1 and EMPTY = 0
   ii) FULL = 0 and EMPTY = 1

Section B

Q2. Attempt all questions: **(2X4 = 8 Marks)**

a i) Explain bus arbitration? Classify different types of bus arbitration with proper block diagram. CO2

Or

ii) Explain the General Register organization with block diagram of 32 registers. CO2

b i) Illustrate bus architecture for 8 registers of size 4 bits each using multiplexers. CO3

Or

ii) Illustrate bus architecture for 8 registers having 4 bits using three-state buffer. CO3

c i) Express into one address and zero address instruction of the following expression $X = A + B * [C * D + E * (F + G)]$ CO2

ii) Express and evaluate the following infix expression into equivalent postfix form $(3 + 4) [10 (2 + 6) + 8]$ CO2

Or

d i) Discuss an instruction format with different fields. Determine the micro-operations that can be executed when the following control words are applied CO2

1) 0010100110010 1
2) 0000010000010

ii) Describe the hardware that implements the following register transfer statements: CO2

1) xyT0 + T1 + y'T2 : AR← AR+1
2) x + yT2 : R2← R1, R1← R2

Or

Section C

(4X1 = 4 Marks)

Q3

i) Relate with the various addressing modes, an instruction is stored at location 400 with its address field at location 401.The address field has the value 500.A processor register R1 contains the number 200. Evaluate the effective address if the addressing mode of the instruction is (i) direct (ii) immediate (iii) relative (iv) register indirect CO1

Or

ii) A digital computer has a common bus system for 16 registers of 32 bits each. The bus is constructed with multiplexers. CO1

a) How many selection inputs are there in each multiplexer?
b) What size of multiplexers are needed?
c) How many multiplexers are there in the bus?