Total No. of printed pages = 8

END SEMESTER / RETEST EXAMINATION – 2022

Semester : 3rd (New)

Subject Code : CO-303

COMPUTER ARCHITECTURE AND ORGANIZATION

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

Instructions :

1. *All* questions of PART–A are compulsory.
2. Answer any *five* questions from PART–B.

PART – A

Marks – 25

1. Choose the correct options for the following : $1 \times 10 = 10$

   (i) The modern computers introduced by John Von Neumann are based on

   (a) General-program Concept

   (b) Fixed-program Concept

   (c) Stored-program Concept

   (d) None of the above

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(ii) The addressing mode, where you directly specify the operand value is

(a) Immediate (b) Direct

(c) Definite (d) Relative

(iii) The Number of AND gates required to realize Y = PQ+ QR + PQR is

(a) 4 (b) 5

(c) 3 (d) 2

(iv) 4 to 2 Encoder has

(a) 2 inputs

(b) 4 inputs

(c) 3 inputs

(d) None of the mentioned above

(v) ROM stands for

(a) Random Only Memory

(b) Read Only Memory

(c) Real time Only Memory

(d) None of the above

(vi) Hardwired Control unit involves the control logic to be implemented with

(a) Programming Approach

(b) Digital Circuits

(c) Analog Circuits

(d) None of the Above

(vii) The Gate which has only one input and only one output is

(a) OR gate (b) NOT gate

(c) AND gate (d) None of these

(viii) The memory device that is generally made of semi-conductor is

(a) RAM (b) Hard-disk

(c) Floppy disk (d) C D

(ix) _____ is generally used to increase the apparent size of physical memory.

(a) Secondary memory

(b) Virtual memory

(c) Hard-disk

(d) Disks

(x) In the memory hierarchy, as the speed of operation increases the memory size

(a) increases (b) decreases

(c) remains same (d) None of these

2. State true or false : $1 \times 10 = 10$

(a) The majority of microprocessors available today use the three-bus system architecture.

(b) Half-adder is a combinational circuit, which produces two outputs sum, S and carry, C.

(c) An universal logic gate is OR gate.

(d) The operation code of an instruction is a group of bits that defines operations such as add, subtract, multiply, shift and compliment.

(e) Accumulator (AC) is a status register.

(f) Micro programmed control unit is input device.

(g) Actual execution of instruction in a computer takes place in Control Unit.

(h) In memory-mapped I/O, the I/O devices and the memory share the same address space.

(i) Registers are at the bottom level of Memory hierarchy.

(j) Hard-disk is a Primary memory.

3. Fill in the blanks : 1×5=5

(a) 2 to 4 Decoder has _____ outputs.

(b) _____ are registers that hold the address for memory unit.

(c) Scanner is a _____ device.

(d) _____ is a technique of diverting the processor from the execution of the current program.

(e) DMA stands for _____.

PART – B

Marks – 45

4. (a) What is a Half-adder ? Write down the truth table and also draw the circuit diagram of half-adder. 3

(b) Represent the circuit diagram and truth table of RS flipflop. 3

(c) Draw the Logic circuit of the following :

(i) AB + BC + AC

(ii) (XY+Z) (Y+Z). 3

5. (a) Write down the purposes of following registers : 4

(i) AC (ii) PC

(iii) Flags (iv) MAR

(b) What do you mean by addressing mode ? Define the following addressing mode :

(i) Indirect Addressing mode

(ii) Register addressing mode. 2+3=5

6. (a) What do you mean by Instruction Code and Instruction Format ? 2

(b) Write briefly about one address and two address instructions. 3

(c) Write briefly about Microprogramme control unit. 4

7. (a) Differentiate between ROM and RAM. 3

(b) What do you mean by Memory Hierarchy ? Explain briefly about cache memory. 3+3=6

8. (a) What is DMA ? 2

(b) Explain briefly the working principles of Virtual memory. 4

(c) Differentiate between memory mapped I/O and Isolated I/O. 3

9. (a) Explain Booth's algorithm to multiply two numbers in 2's complement form. 4

(b) Use the Booth's algorithm to multiply 5 with –3. 5

10. (a) Write brief notes on Programmed I/O and Interrupt initiated I/O. 5

(b) Write a brief note on Printer. 4

11. Write short notes on any *three* : 3×3=9

(a) Signed Number Representation

(b) Encoder

(c) Von Neumann Architecture

(d) Asynchronous Data Transfer

(e) Associative Memory.