



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

## INFORMATION TECHNOLOGY

### ASSIGNMENT

|                    |   |  |
|--------------------|---|--|
| Course Name        | : | Digital Logic Design and Computer Organization |
| Course Code        | : | A30402   |
| Class              | : | I IB. Tech I Semester                          |
| Branch             | : | Information Technology                         |
| Year               | : | 2015 – 2016                                    |
| Course Coordinator | : | Mr. E. Sunil Reddy, Assistant Professor, IT    |
| Course Faculty     | : | Mr. E. Sunil Reddy, Assistant Professor, IT    |

### OBJECTIVES

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated and taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education. The major emphasis of accreditation process is to measure the outcomes of the program that is being accredited.

In line with this, Faculty of Institute of Aeronautical Engineering, Hyderabad has taken a lead in incorporating philosophy of outcome based education in the process of problem solving and career development. So, all students of the institute should understand the depth and approach of course to be taught through this question bank, which will enhance learner's learning process.

| S. No   | Question   | Blooms Taxonomy Level | Course Outcome |
|---|--|-----------------------|----------------|
| <b>ASSIGNMENT-I UNIT-I</b>                                  |  |                       |                |
| <b>Basic Structure of Computers and Data Representation</b> |  |                       |                |
| 1   | <b>Explain</b> the various types of computers and their applications.  | Understand            | 1              |
| 2   | <b>Explain</b> the basic functional units of a computer and explain each unit in detail.   | Understand            | 1              |
| 3   | <b>Discuss</b> the operational concepts of a digital computer.   | Understand            | 1              |
| 4   | (a). <b>Define</b> by system software?<br>(b). <b>Explain</b> various functions of system software.<br>(c) . <b>Define</b> a text editor?  | Understand            | 1              |
| 5   | <b>Explain</b> Various types of Buses.   | Understand            | 1              |
| 6   | <b>Explain</b> various performance measures used to represent computer performance.  | Understand            | 1              |
| 7   | <b>Differentiate</b> between RISC and CISC   | Analyze               | 1              |
| 8   | <b>Describe</b> the introduction of each generation of computer system   | Understand            | 2              |
| 9   | <b>Solve</b> the number $(+465.5)_{10}$ as a floating point binary number with 24 bits the Normalized fraction mantissa has 16 bits and the exponent has 8 bits.   | Apply                 | 1              |
| 10  | <b>Solve</b> the single precision representation for 42.75 and 16.125.   | Apply                 | 1              |
| 11  | <b>Solve</b> 32.75 and 18.125 in single precision IEEE 754 representation.   | Apply                 | 1              |
| 12  | <b>Solve</b> the 1's and 2's complement of the following binary numbers,<br>1010101,0111000,0000001,10000,00000<br>Also obtain 9's and 10's complement of the following decimal<br>Numbers, 09900, 10000, 00000. | Apply                 | 1              |
| 13  | <b>Show</b> decimal number 8620 in<br>(i) BCD<br>(ii) Excess-3 code<br>(iii) 2421 code<br>(iv) As a binary number  | Apply                 | 1              |
| 14  | <b>Explain</b> the classification of binary codes.   | Understand            | 1              |
| 15  | <b>Discuss</b> in detail about binary signed number.   | Understand            | 1              |
| 16  | <b>Calculate</b> the following to binary and then to gray code,<br>(a) $1001_{16}$   | Apply                 | 1              |

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|   | (b) ABEF <sub>16</sub><br>(c) 7623 <sub>8</sub><br>(d) 1234 <sub>8</sub><br>(e) 1257 <sub>10</sub><br>(f) 2239 <sub>10</sub>   |                       |                |
| <b>ASSIGNMENT – II UNIT-II</b><br><b>Digital Logic Circuits-I and Digital Logic Circuits-II</b> |  |                       |                |
| 1   | <b>Explain</b> the basic logic functions along with their truth tables.  | Understand            | 3              |
| 2   | <b>Describe</b> the truth tables, Boolean equations and symbols of the basic logic gates.  | Understand            | 2              |
| 3   | <b>Explain</b> A NOR gate is also referred to as negative AND gate.  | Understand            | 2              |
| 4   | <b>Solve</b> the expression $Y = AB^1 + A^1B$ using only 2 input NAND gates.   | Apply                 | 2              |
| 5   | <b>Solve</b> and Simplify the Boolean equation $Y = AB^1C^1 + A^1BC^1 + AB^1C + ABC^1$ and realize the logic circuit.  | Apply                 | 5              |
| 6   | <b>Solve</b> and Simplify the following Boolean functions, using three-variable maps,<br>$F(x, y, z) = \sum (0, 2, 6, 7)$<br>$F(a, b, c) = \sum (0, 1, 2, 3, 7)$ .   | Apply                 | 5              |
| 7   | <b>Solve</b> and Simplify the following Boolean function using K map,<br>$F(A, B, C, D) = \sum (3, 7, 11, 13, 14, 15)$ .   | Apply                 | 5              |
| 8   | <b>Solve</b> the following operation Minimize $F(A, B, C, D) = \sum (3, 6, 8, 11, 13, 14)$ and don't cares $\sum (4, 10, 15)$ .  | Apply                 | 5              |
| 9   | <b>Solve</b> and Simplify the following Boolean function $F(W, X, Y, Z) = \sum (1, 3, 7, 11, 15)$ and the don't care conditions $d(W, X, Y, Z) = \sum (0, 2, 5)$   | Apply                 | 5              |
| 10  | <b>Define</b> a latch and a flip-flop. Mention the similarities and differences between them.  | Knowledge             | 5              |
| 11  | <b>Sketch</b> a neat circuit diagram of positive triggered D flip-flop and explain its operation.  | Apply                 | 6              |
| 12  | <b>Explain</b> the operation of a JK flip flop using its block diagram and truth table. What are its limitations?  | Understand            | 6              |
| 13  | <b>Describe</b> the working of a shift right register.   | Understand            | 12             |
| 14  | <b>Sketch and explain</b> a 4-bit synchronous binary counter based on JK flip flops.   | Apply                 | 6              |
| 15  | <b>Explain</b> the operation of 3-to-8 decoder with circuit diagram.   | Understand            | 7              |
| 16  | <b>Sketch</b> the logic diagram of a 2-to-4 line decoder using NOR gates and explain its functioning.  | Apply                 | 2              |
| 17  | <b>Construct</b> a 5-to-32 line decoder with four 3-to-8 line decoders with enable and one 2-to-4 line decoder.  | Apply                 | 2              |
| 18  | <b>Describe</b> a combinational logic circuit is defined by the following Boolean functions.<br>$F_1 = \overline{A}\overline{B}\overline{C} + AC$<br>$F_2 = \overline{A}\overline{B}\overline{C} + \overline{A}B$<br>$F_3 = \overline{A}\overline{B}\overline{C} + AB$<br>Construct a circuit with a decoder and external gates. | Understand            | 12             |
| 19  | <b>Explain</b> combinational PLD? List and describe the major types of combinational PLDs.   | Knowledge             | 9              |
| 20  | <b>Define</b> PAL? <b>Explain</b> the internal structure of PAL.   | Understand            | 9              |
| 21  | <b>Solve</b> and Simplify the following Boolean functions with a PAL.<br>$F_1(A, B, C) = \sum (0, 1, 2, 4)$<br>$F_2(A, B, C) = \sum (0, 5, 6, 7)$  | Apply                 | 5              |
| 22  | Design a PAL for the following equation, $F = a^1b^1c + b^1c + ab$   | Create                | 6              |
| 23  |  |                       |                |
| <b>UNIT-III</b><br><b>Computer Arithmetic and Instruction set &amp; Addressing</b>              |  |                       |                |
| 1   | <b>Explain</b> addition subtraction algorithm. With diagram.   | Understand            | 8              |
| 2   | <b>Explain</b> multiplication algorithm. With diagram.   | Understand            | 8              |
| 3   | <b>Sketch</b> and Explain booth multiplication algorithm. With numerical example.  | Knowledge             | 8              |
| 4   | <b>Sketch</b> and Explain division algorithm. With numerical example.  | Knowledge             | 8              |
| 5   | <b>Explain</b> floating point addition subtraction algorithm. With diagram.  | Understand            | 8              |
| 6   | <b>Explain</b> floating point multiplication algorithm. With diagram.  | Understand            | 8              |
| 7   | <b>Explain</b> floating-point division algorithm. With diagram.  | Understand            | 8              |
| 8   | <b>Explain</b> decimal division algorithm. With diagram.   | Understand            | 8              |
| 9   | <b>Explain</b> BCD-Adder with block diagram.   | Understand            | 8              |

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| 10   | <b>Discuss</b> about the following.<br>(i) Condition codes<br>(ii) Straight line sequencing.   | Understand            | 8              |
| 11   | <b>Explain</b> various addressing modes of computer with examples.   | Understand            | 11             |
| 12   | <b>Explain</b> in detail the basic instruction types with examples.  | Understand            | 11             |
| 13   | <b>Explain</b> about the Addressing modes present in IA-32 Pentium processor.  | Understand            | 11             |
| 14   | <b>Explain</b> the format of an IA-32 instruction.   | Understand            | 11             |
| 15   | <b>Describe</b> the format of status register of IA-32 and explain each of the flag.   | Understand            | 8              |
| 16   | <b>Describe</b> how many address bits are needed to create an address space of 4G.   | Understand            | 11             |
| <b>ASSIGNMENT – III UNIT-IV</b><br><b>Processor Organization and Memory Organization</b> |  |                       |                |
| 1  | <b>Explain</b> single-bus organization of the data path inside a Processor.  | Understand            | 16             |
| 2  | <b>Explain</b> about multiple bus organization.  | Understand            | 16             |
| 3  | <b>Define</b> the following<br>(i) Micro operation<br>(ii) Micro program<br>(iii) Micro instruction  | Knowledge             | 16             |
| 4  | <b>Define</b> memory? Briefly <b>explain</b> micro computer memories.  | Understand            | 17             |
| 5  | <b>Discuss</b> the purpose of main memory and secondary memory in a computer.<br>What is a non-volatile memory? Give examples of volatile and non-volatile memory. | Understand            | 17             |
| 6  | <b>Discuss</b> in detail memory interleaving.  | Understand            | 17             |
| 7  | <b>Explain</b> in detail various cache memory organizations.   | Understand            | 18             |
| 8  | <b>Define</b> cache memory? Why has it become an integrated part of modern CPUs?<br>What is a hit and miss? What is meant by hit ratio?                            | Knowledge             | 18             |
| 9  | <b>Describe</b> a brief note on page replacement algorithms.   | Knowledge             | 18             |
| 10   | <b>Explain</b> each of the following<br>(i) Page fault<br>(ii) Page table<br>(iii) Page replacement<br>(iv) Translation look-aside buffer.                         | Understand            | 18             |
| 11   | <b>Compare</b> the characteristics of a floppy disk and a hard disk.   | Understand            | 17             |
| 12   | <b>Describe</b> the limitations of a semiconductor memory? Explain in detail various secondary storage devices.  | Knowledge             | 18             |
| 13   | <b>Explain</b> the memory management requirements.   | Understand            | 18             |
| <b>UNIT-V</b><br><b>Input / Output Organization</b>                                      |  |                       |                |
| 1  | <b>Explain</b> the different kinds of I/O communication techniques? What are the relative advantages and disadvantages? Compare and contrast all techniques        | Knowledge             | 14             |
| 2  | <b>Discuss</b> with suitable example the concept of programmed I/O.  | Understand            | 14             |
| 3  | <b>Differentiate</b> between a subroutine and an interrupt service routine?  | Knowledge             | 14             |
| 4  | <b>Sketch</b> block diagram of typical daisy-chain priority interrupt scheme and explain its operation.  | Apply                 | 14             |
| 5  | <b>Write</b> short notes on DMA controller.  | Knowledge             | 14             |
| 6  | <b>Write</b> short notes on DMA Transfer.  | Knowledge             | 14             |
| 7  | <b>Explain</b> the need for bus arbitration? Explain the two approaches to bus arbitration.  | Understand            | 15             |
| 8  | <b>Explain</b> PCI with a neat sketch.   | Understand            | 15             |
| 9  | <b>Explain</b> Brief notes on the following standard I/O Interfaces.<br>(a) SCSI<br>(b) PCI  | Understand            | 15             |
| 10   | <b>Discuss</b> about USB Protocols.  | Understand            | 14             |
|  | <b>Explain</b> the disadvantage of the strobe method? Explain how handshake method solves the problem?   | Understand            | 15             |