

**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)**

Siddharth Nagar, Narayanavanam Road – 517583



QUESTION BANK (DESCRIPTIVE)

Subject with Code: Fundamentals of Digital Computing Systems (20EC0401)
Year & Sem: I-B.Tech & II-Sem

Course & Branch: B.Tech - ECE
Regulation: R20

**UNIT –I
COMPUTERS AND SYSTEMS**

1	Briefly explain the different elements that are made of a computer-based information system.	[L2][CO1]	[12M]
2	Distinguish primary storage and secondary storage. What is each type used for?	[L2][CO1]	[12M]
3	a Sketch the IPO model and describe its functional blocks.	[L3][CO2]	[6M]
	b Justify why Protocols and standards are an important feature of networks	[L5][CO3]	[6M]
4	a Interpret the concept of virtualization and describe its importance.	[L2][CO3]	[6M]
	b Discuss about early history and modern computer development.	[L2][CO1]	[6M]
5	a List the components of a computer system.	[L1][CO1]	[2M]
	b With the help of a neat block diagram explain the hardware component of computer system	[L2][CO1]	[10M]
6	a Briefly explain the communication component of a computer system	[L2][CO1]	[5M]
	b What are the major considerations and factors that would be important while buying a computer? Justify your answer.	[L5][CO1]	[7M]
7	Illustrate and describe the two major categories of software component of a computer system.	[L2][CO1]	[12M]
8	a List the types of computers and write short notes of each computer.	[L1][CO1]	[6M]
	b Describe the features of IBM -Z series mainframe computers.	[L2][CO1]	[6M]
9	a Interpret the following terms: (i) Computer network (ii) Internet	[L2][CO3]	[4M]
	b List the applications of a network.	[L1][CO1]	[2M]
	c Discuss the various types of network media, network hardware and protocols.	[L2][CO1]	[6M]
10	a Describe the early work for the development of modern operating systems.	[L1][CO1]	[6M]
	b For the computer that you normally use, identify which pieces constitute the hardware and which pieces constitute the system software. Now think about the file system of your computer. What part of the file system is hardware, what part software, and what part data? Explain.	[L4][CO1]	[6M]

UNIT –II
AN INTRODUCTION TO SYSTEM CONCEPTS AND SYSTEMS ARCHITECTURE

1	a	Explain the relationship among the following words: system, environment, boundary and interface with a neat sketch.	[L2][CO3]	[5M]
	b	With an example, discuss the relationship between a system and its environment.	[L2][CO3]	[7M]
2	a	Explain the following statement about systems: “Decomposition is inherently hierarchical”.	[L2][CO3]	[3M]
	b	Exemplify the concept of client-server computing with a neat diagram.	[L2][CO2]	[9M]
3	a	Define architecture of a system.	[L1][CO2]	[2M]
	b	With the help of diagram explain how multiple servers offering different services on the same network.	[L2][CO3]	[5M]
	c	Describe the advantages of client-server computing with some examples.	[L2][CO3]	[5M]
4	a	Write a short note on top-down approach in IT system architecture	[L2][CO3]	[4M]
	b	List the application architectures which are commonly used in the IT system architectures.	[L1][CO3]	[2M]
	c	With few real time examples, explain the need of distributing the computing capability within organizations or to other organizations.	[L2][CO3]	[6M]
5	a	Discuss the importance of application architecture in IT system design.	[L2][CO3]	[3M]
	b	Why web-based system architecture is a popular approach to many organizational systems? Justify your answer with an example.	[L5][CO3]	[9M]
6	a	Sketch the comparison between cloud service levels and computer system layers.	[L2][CO2]	[3M]
	b	Briefly discuss the major advantages and risks to an organization when considering the adoption of cloud computing	[L2][CO2]	[9M]
7	a	Write a short note on cloud computing	[L2][CO2]	[3M]
	b	Classify the services provided by cloud computing and explain them briefly.	[L2][CO2]	[9M]
8	a	Describe the principal responsibilities of a system architect.	[L2][CO2]	[3M]
	b	Explain the concept of peer-peer computing and its advantages and disadvantages compared with client-server computing.	[L2][CO3]	[9M]
9	a	Sketch the partial view of business application architecture	[L3][CO3]	[3M]
	b	Illustrate Facebook’s application architecture and explain how it processes the user application requests.	[L2][CO3]	[9M]
10		What is the primary mission of google? With the help of diagrams, explain how google designed its IT system architecture to achieve its mission.	[L2][CO3]	[12M]

UNIT –III
NUMBER SYSTEMS

1	a	Discuss various number systems of a computer.	[L2][CO4]	[8M]
	b	Tabulate the numbers up to 15 which can be represented in base-2, base-8, base 10 and base -16.	[L2][CO4]	[4M]
2	a	Compute the power of each digit for five-digit numbers in base 6.	[L3][CO4]	[2M]
	b	Use your results from part (a) to convert the base 6 number $(24531)_6$ to decimal.	[L3][CO4]	[4M]
	c	Some older computers used an 18-bit word to store numbers. Calculate, what is the decimal range for this word size?	[L3][CO4]	[2M]
	d	Calculate, how many bits will it take to represent the decimal number 3,175,000 and how many bytes will it take to store this number.	[L3][CO4]	[4M]
3	a	Infer the values after multiplying the following binary numbers: (i) $(1101)_2 \times (101)_2$ (ii) $(11011)_2 \times (1011)_2$	[L4][CO6]	[6M]
	b	Show the results after performing the following binary divisions: (i) $(1010001001)_2$ by $(110)_2$ (ii) $(11000000000)_2$ by $(1011)_2$	[L3][CO6]	[6M]
4	a	Create addition and multiplication tables for base 12 arithmetic. Use alphabetic characters to represent digits 10 and larger	[L6][CO4]	[4M]
	b	Apply the results obtained from part 6(a) tables, and calculate the values for the following addition: $(25A84)_{12}$ $+ (70396)_{12}$	[L4][CO6]	[4M]
	c	Apply the results obtained from part 6(a) tables, and calculate the values for the following multiplication: $(2A6)_{12}$ $\times (B1)_{12}$	[L4][CO6]	[4M]
5	a	Show the results after performing the following binary additions: i) $(101101101)_2 + (10011011)_2$ ii) $(110111111)_2 + (110111111)_2$ iii) $(11010011)_2 + (10001010)_2$ iv) $(1101)_2 + (1010)_2 + (111)_2 + (101)_2$	[L3][CO6]	[8M]
	b	Use the results obtained from (i), (ii), (iii) & (iv) of 5(a) part and convert them to hexadecimal and decimal numbers.	[L2][CO4]	[4M]
6	a	Using the powers of each digit in base 8, convert the decimal number $(6026)_{10}$ to octal.	[L2][CO4]	[3M]
	b	Using the powers of each digit in hexadecimal, convert the decimal number $(6026)_{10}$ to hexadecimal.	[L2][CO4]	[3M]
	c	Calculate the decimal value of the following binary numbers (i) $(1100101.1)_2$ (ii) $(1110010.11)_2$ (iii) $(11100101.1)_2$	[L4][CO4]	[6M]
7	a	Using the division method, convert the following decimal numbers: (i) $(13750)_{10}$ to base 12 (ii) $(6026)_{10}$ to hexadecimal (iii) $(3175)_{10}$ to base 5	[L2][CO4]	[6M]
	b	Convert the following numbers from their given base to decimal: (i) $(0.1001001)_2$ (ii) $(0.3A2)_{16}$ (iii) $(0.2A1)_{12}$	[L2][CO4]	[6M]
8	a	Convert the following numbers from decimal to binary and then to hexadecimal: (i) $(27.625)_{10}$ (ii) $(4192.37761)_{10}$	[L2][CO4]	[8M]
	b	Convert the octal number $(27745)_8$ to hexadecimal without using decimal as an intermediary for the conversion.	[L2][CO4]	[2M]
	c	Convert the base 3 number $(210102)_3$ to octal.	[L2][CO4]	[2M]

9	a	Convert the following hexadecimal numbers to binary: (i) $(4F6A)_{16}$ (ii) $(9902)_{16}$ (iii) $(A3AB)_{16}$	[L2][CO4]	[6M]
	b	Convert the following binary numbers directly to hexadecimal: (i) $(101101110111010)_2$ (ii) $(1111111111110001)_2$ (iii) $(110001100011001)_2$	[L2][CO4]	[6M]
10	a	Using the multiplication method, convert the following numbers to decimal: (i) $(1100010100100001)_2$ (ii) $(C521)_{16}$ (iii) $(3ADF)_{16}$ (iv) $(24556)_7$	[L2][CO4]	[8M]
	b	Convert $(0.12201)_3$ to base 10.	[L2][CO4]	[2M]
	c	Convert $(0.828125)_{10}$ to base 2.	[L2][CO4]	[2M]

UNIT –IV
DATA FORMATS

1	a	Summarize various types of common data that can be represented in a computer.	[L2][CO5]	[6M]																																										
	b	Briefly explain the three standards that are used in common for alphanumeric characters.	[L2][CO5]	[6M]																																										
2	a	<p>A secret message is transmitted from the other planet to earth in the form of binary and each binary code has a unique character. By using the table given below, analyze the given message and determine the secret code.</p> <p>Binary code: 1100111010000011111100000010011011111110111110000000100100</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>M</td><td>00001</td><td>∴</td><td>10000</td><td>G</td><td>11111000</td> </tr> <tr> <td>E</td><td>00010</td><td>U</td><td>10011</td><td>&</td><td>11111011</td> </tr> <tr> <td>S</td><td>00100</td><td>□</td><td>10101</td><td>→</td><td>11111101</td> </tr> <tr> <td>Z</td><td>01000</td><td>✖</td><td>10110</td><td>N</td><td>11111110</td> </tr> <tr> <td>O</td><td>01011</td><td>I</td><td>11001</td><td></td><td></td> </tr> <tr> <td>P</td><td>01101</td><td>A</td><td>11010</td><td></td><td></td> </tr> <tr> <td>V</td><td>01110</td><td></td><td></td><td></td><td></td> </tr> </table>	M	00001	∴	10000	G	11111000	E	00010	U	10011	&	11111011	S	00100	□	10101	→	11111101	Z	01000	✖	10110	N	11111110	O	01011	I	11001			P	01101	A	11010			V	01110					[L4][CO5]	[8M]
	M	00001	∴	10000	G	11111000																																								
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V	01110																																													
	b	Write a short note on PNG & JPEG image formats.	[L2][CO5]	[4M]																																										
3	a	Write the characteristics of a bitmap image.	[L2][CO5]	[4M]																																										
	b	Why images must be stored and manipulated as bitmap images? Justify your answer.	[L5][CO5]	[8M]																																										
4	a	Define image metadata. Give at least three examples of metadata that would be required for a bitmap image.	[L2][CO5]	[5M]																																										
	b	With a neat sketch, explain the bitmap image storing format GIF.	[L2][CO5]	[7M]																																										
5		With an example, explain about the object image.	[L2][CO5]	[12M]																																										
6		With a neat sketch, describe how an A-to-D converter converts audio data into binary data.	[L2][CO5]	[12M]																																										
7		Describe the most important characteristics and features of the following audio file formats: (i) .MP3 (ii) .WAV	[L2][CO5]	[12M]																																										
8	a	Write the advantages of data compression.	[L3][CO5]	[2M]																																										
	b	Distinguish lossless and lossy data compressions algorithms.	[L4][CO5]	[10M]																																										
9	a	Define page description language and enumerate various page description languages.	[L2][CO5]	[4M]																																										
	b	List the five simple data types that are provided in most high-level programming languages and write a short note on each datatype.	[L1][CO5]	[8M]																																										
10		Write a pseudocode procedure that performs string conversion to number.	[L3][CO4]	[12M]																																										

UNIT – V
REPRESENTING NUMERICAL DATA

1	a	Calculate the value of largest unsigned integer that can be stored as a 16-bit number.	[L3][CO4]	[2M]
	b	Describe the unsigned binary and binary coded decimal representations with an example.	[L2][CO6]	[5M]
	c	Convert the following decimal numbers into BCD and calculate the value by adding them: 24 and 37	[L2][CO6]	[5M]
2	a	Define one's complement, two's complement form and explain the relation between them.	[L3][CO6]	[6M]
	b	Calculate the 16-bit 1's and 2's complements of the following binary numbers. (i). 10000 (ii). 100111100001001 (iii). 0100111000100100	[L3][CO6]	[6M]
3	a	Define nine's complement, ten's complement and explain the relation between them.	[L2][CO4]	[6M]
	b	Determine the result for the following decimal numbers operation by performing addition and convert each result to five-digit 10's complementary form, (i) 24379 5098 (ii) 24379 -5098 (iii) -24379 5098	[L3][CO4]	[6M]
4	a	Explain the procedure for adding two numbers in 2's complement form. As an example, convert +38 and -24 to 8-bit 2's complement form and add them.	[L2][CO6]	[9M]
	b	Determine the 9's complementary representation for the three-digit number -467.	[L3][CO4]	[3M]
5	a	Calculate the result by performing addition of the following two floating point numbers and round the result to five places of precision. i) 05199520 ii) 625.2035 iii) 1024.775E2 +04967850 +25.7585 +512.225E0	[L3][CO4]	[6M]
	b	Calculate the result by performing subtraction of the following two floating point numbers and round the result to five places of precision. i) 05199520 ii) 625.2035 iii) 7024.775E2 -03967850 -25.7585 -512.225E0	[L2][CO4]	[6M]
6	a	Determine the 16-bit 2's complementary binary representation for the decimal numbers 2021 and -2021	[L3][CO6]	[4M]
	b	Describe the exponential notation with an example.	[L2][CO4]	[8M]
7	a	Compute the floating-point representation for 0.0000019557.	[L3][CO4]	[3M]
	b	Compute division of the following two numbers, normalize the result obtained and round it to 3-bit. i) 04220000 / 02712500 ii) 625.2035 /25.7585 iii) 7024.775E2/512.225E0	[L3][CO5]	[9M]
8	a	Represent the decimal number 171.625 in IEEE 754 format.	[L2][CO4]	[3M]
	b	Convert the decimal number 253.75 to binary floating point form.	[L2][CO6]	[3M]
	c	The IEEE provides a standard 32-bit format for floating point numbers. The format for a number is specified as $\pm 1.M \times 2^{E-127}$. Explain each part of this format.	[L2][CO4]	[6M]
9	a	Illustrate the structure of Typical 32-bit & 64-bit Floating Point Format.	[L2][CO4]	[3M]
	b	Briefly explain about IEEE 754 Standard.	[L2][CO4]	[6M]
	c	Convert the decimal number 253.75 to 32-bit IEEE 754 floating-point form.	[L3][CO4]	[3M]

10	Determine the result of multiplying two floating point numbers, normalize and round the result to 3-digit. i) 05220000 ii) 625.2035 iii) 7024.775E2 ×04712500 ×25.7585 ×512.225E0	[L3][CO4]	[12M]
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