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VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 6013

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – JUNE 2023

Fifth Semester

Information Technology

U19IT514 – MICROPROCESSOR AND MICROCONTROLLER

(Regulation 2019)

Time: Three Hours

Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

Q.No.	Questions	(10 x 2 = 20 Marks)		
		Marks	KL	CO
1.	What is the 8086 microprocessor? What is the maximum memory capacity supported by the 8086 microprocessor?	2	K1	CO1
2.	What is the purpose of the flag register in the 8086 microprocessor?	2	K2	CO1
3.	How many ports are available in the 8255A?	2	K1	CO2
4.	List out the purpose of the interrupt request register in the 8259A.	2	K4	CO2
5.	How many bytes of internal RAM and ROM does the 8051 have?	2	K1	CO3
6.	How timers works in the 8051 microcontroller?	2	K2	CO3
7.	What is the function of the SJMP instruction in 8051 assembly language?	2	K1	CO4
8.	What is an opcode in assembly language for the 8051 microcontroller?	2	K1	CO4
9.	What is the role of a microcontroller in an embedded system?	2	K2	CO5
10.	List the differences between firmware and software in embedded systems.	2	K4	CO5

PART – B

Q.No.	Questions	(5 x 13 = 65 Marks)		
		Marks	KL	CO
11. a)	Explain the architecture of 8086 with a block diagram.	13	K2	CO1
(OR)				
b)	Draw the Memory Read timing diagram of 8086 in Minimum mode. Describe the status of the relevant signals during each clock period.	13	K1,K2	CO1

12.	a)	Draw the architectural block diagram of 8259A Programmable Interrupt Controller and explain the role of each functional part.	13	K1 K4	CO2
		(OR)			
	b)	i. What are the different modes of operation of the 8255A PPI?	7	K4	CO2
		ii. Briefly describe the control word format of 8255A PPI.	6	K1	
13.	a)	Explain the different addressing modes of 8051 microcontroller with suitable example.	13	K2 K3	CO3
		(OR)			
	b)	Describe the different modes of operations of timers/counters in 8051 microcontroller with its associated registers.	13	K2 K3	CO3
14.	a)	How many interrupts have been provided in 8051? Explain the necessary conditions which cause these interrupts to be generated. Also arrange them in the decreasing order of priority.	13	K1 K5	CO4
		(OR)			
	b)	i. Write an 8051 assembly language program to find the largest of ten numbers stored in RAM location 47H onwards. Output the result in port1.	7	K6	CO4
		ii. Explain about I/O ports of 8051.	6	K2	
15.	a)	i. Define an Embedded System? Explain the characteristics of Embedded Systems.	7	K1 K2	CO5
		ii. Write classification of embedded systems and explain in detail.	6	K2	
		(OR)			
	b)	i. Explain the different types of processors according to instruction set architecture.	7	K2 K3	CO5
		ii. Write difference between embedded system and general computing system.	6	K4	

PART – C

		(1 x 15 = 15 Marks)		
Q.No.	Questions	Marks	KL	CO
16.	a) Explain the role of micro controller in washing machine control with assembly language program.	15	K3 K5	CO4
	(OR)			
	b) Draw the block diagram of traffic light control system using 8086. Write the algorithm and ALP for the same.	15	K3 K6	CO4

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Question Paper Code: 6015

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – JUNE 2023

Third Semester

Information Technology

U19IT303 – DATA STRUCTURES

(Regulation 2019)

Time: Three Hours

Maximum: 100 Marks

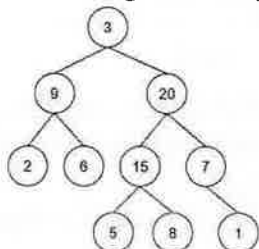
Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Write down merits and demerits of array and linked list over each other for insertion and deletion operations.	2	K1	CO1
2.	Write any two advantages of doubly linked list over singly linked list.	2	K2	CO1
3.	Write the differences between stack and double ended queue data structures.	2	K1	CO2
4.	How can double ended queue be used for backtracking?	2	K2	CO2
5.	What is insertion sort? What is best case time complexity of insertion sort?	2	K1	CO3
6.	Explain working of binary search algorithm on a sorted list of elements. Why is it more efficient than linear search?	2	K2	CO3
7.	Write the in-order traversal of the given binary tree.	2	K3	CO4



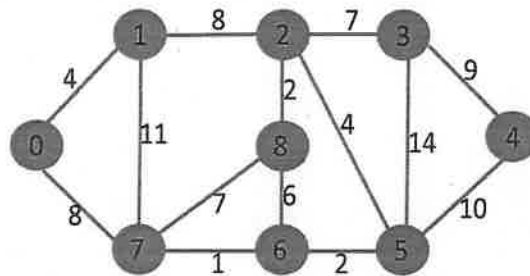
8.	What are height balancing trees? State its uses.	2	K2	CO4
9.	What is topological ordering? Write any two applications of topological ordering.	2	K2	CO5
10.	Write advantages and disadvantages of adjacency list representation over matrix representation of a graph in the memory.	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11. a)	i. Write a pseudo code to create a linked list containing first 100 Fibonacci numbers.	5		CO
	ii. Write a function that reverses a linked list.	8	K3	CO1
(OR)				
b)	i. Write a pseudo code to check whether the elements of a given doubly linked list form a palindrome or not.	5		CO1
	ii. Write a function to merge two sorted doubly linked lists.	8	K3	CO1
12. a)	i. Consider a stack of 'm' elements and a queue of 'n' elements both in sorted (increasing) order, write a pseudo code to find out the common elements of the stack and the queue.	5		CO2
	ii. Design a stack data structure that supports getMin() operation together with usual stack operations. The getMin() procedure returns the minimum element present in the stack. The minimum element may change due to push or pop of elements from the stack. Only Stack data structure should be used. The getMin() procedure should take O(1) time.	8	K6	CO2
(OR)				
b)	i. Write a procedure to reverse the order of contents of the stack using a queue data structure.	5		
	ii. Implement a PriorityQueue data structure. The data structure should support enqueue(int x, int priority) and dequeue() operations which works as usual. Explain properly the working of the data structure.	8	K3	CO2
13. a)	i. Write pseudocode to implement merge sort. Apply merge sort on the array {13, 42, 10, 60, 32, 105, 62, 77, 9, 99, 1}.	5		CO3
	ii. What is a pivot element in quick sort? Write quick sort algorithm and explain the time complexity in worst case. Explain the input array scenario which results in the worst case time complexity.	8	K3	CO3
(OR)				
b)	Consider a hash table with 9 slots. The hash function is $h(k)=k \text{ mod } 9$. The following 9 keys are inserted in the given order: 5, 28, 19, 15, 20, 33, 12, 17, 10.			
	i. Find the number of collisions, if collisions are resolved by linear probing.	5	K3	CO3
	ii. Find the maximum, minimum, and average chain lengths, if the collisions are resolved by chaining.	8		

14. a) i. Write algorithms for pre-order, post-order and in-order tree traversals and explain them using a single tree. 8 K3 CO4
 ii. The preorder traversal of a Binary Search Tree gives 15, 10, 8, 12, 20, 16, 25. Construct the Binary Search Tree. 5
- (OR)
- b) i. Write and explain deletion algorithm for a binary search tree. (Cover all possible cases with some examples) 8 K2 CO4
 ii. Write algorithm to find height of a Binary Tree. What is the maximum possible height (use Big O notation) in binary tree, BST and AVL tree?(if there are n nodes in the tree) 5
15. a) i. Explain the working of Dijkstra's algorithm for the given graph starting from vertex 0. 8



- ii. Will Dijkstra's algorithm work when there are negative weighted edges? Explain with the help of an example. 5 K3 CO5
- (OR)
- b) i. What are the differences between Prim's and Kruskal's algorithm? Explain the working of Prim's algorithm for the graph given in 15.(a)i. 8 K3 CO5
 ii. What is a bipartite graph? Give an algorithm to verify whether a given graph is a bipartite graph. 5

PART – C

(1 x 15 = 15 Marks)

- | Q.No. | Questions | Marks | KL | CO |
|--------|---|-------|----|-----|
| 16. a) | Suppose there are n jobs where each job i is of the form $(s(i), f(i))$. $s(i)$ is the start time of job and $f(i)$ is the finish time. Design an algorithm which computes and returns the maximum possible number of jobs that can be scheduled on a single machine. | 15 | K6 | CO5 |
| (OR) | | | | |
| b) | Consider a weighted graph $G(V,E)$ and one of its minimum spanning tree T . A new edge (u, v) of weight w is added to the graph. Give an $O(V)$ time algorithm to verify whether the tree T is still a minimum spanning tree of the modified graph. Justify the algorithm. In case T does not remain an MST, what are the steps needed to update the minimum spanning tree T efficiently? | 15 | K6 | CO5 |

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Question Paper Code: 6017

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – JUNE 2023

Third Semester

Information Technology

U19IT302 - DATA COMMUNICATIONS

(Regulation 2019)

Time : Three Hours

Maximum : 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	What are the various types of network?	2	K1	CO1
2.	What is the difference between bandwidth and data rate?	2	K1	CO1
3.	Distinguish between analog and digital signals	2	K2	CO2
4.	Why do we use line coding?	2	K3	CO2
5.	How are analog signals transmitted?	2	K4	CO3
6.	What is the difference between amplitude modulation and amplitude shift keying?	2	K2	CO3
7.	What is error and its types in data communication?	2	K3	CO4
8.	Give an example of circuit-switched network.	2	K4	CO4
9.	How is a networking device useful?	2	K5	CO5
10.	Is a modem the same as a router?	2	K6	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11. a)	With a neat block diagram, Explain the functions of each layer in an OSI system architecture.	13	K1	CO1
(OR)				
b)	What are transmission media? What are its types? With diagrams, explain the salient features of each.	13	K2	CO1

12.	a)	What are the different categories of line coding schemes? Explain their working with appropriate diagrams.	13	K2	CO2
		(OR)			
	b)	i. With diagrams, explain the how pulse code modulation is performed for an input signal.	7	K3	CO2
		ii. Compare Manchester encoding with Differential Manchester encoding.	6	K2	CO2
13.	a)	i. What is the need for modulation? Explain.	7	K3	CO3
		ii. With a neat block diagram, explain the working of Phase shift keying.	6	K3	CO3
		(OR)			
	b)	i. Explain any one technique that can be used for digital to analog conversion	7	K4	CO3
		ii. What are the different types of modulation? Explain the need and the principle behind the working of any one modulation technique.	6	K4	CO3
14.	a)	i. With examples, explain how asynchronous serial and parallel data transmission takes place in a network.	7	K3	CO4
		ii. What is a Frame relay? How is it useful?	6	K4	CO4
		(OR)			
	b)	i. What are the different types of switching? Highlight the merits and demerits of each.	7	K3	CO4
		ii. What is X.25 in a network? Why is it required? Explain.	6	K4	CO4
15.	a)	What are the different types of networking devices? Discuss in brief about their working, citing where each device is used.	13	K5	CO5
		(OR)			
	b)	Discus in brief about:			
		i. Transceivers	7	K3	CO5
		ii. Firewall	6	K3	CO5

PART – C

		(1 x 15 = 15 Marks)		
Q.No.	Questions	Marks	KL	CO
16.	a) Discuss in detail about the various techniques used for error control in Data link layer citing examples.	15	K4	CO4
	(OR)			
	b) i. What is a Wireless Access Point? What are its components? Explain its working.	8	K5	CO5
	ii. List the advantages and disadvantages of a Wireless Access Point.	7	K5	CO5

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Question Paper Code: 6021

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – JUNE 2023

Third Semester

Information Technology

U19IT305 – PROFESSIONAL ETHICS AND HUMAN VALUES

(Regulation 2019)

Time: Three Hours

Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Quote few examples for Work ethic.	2	K2	CO1
2.	“Once it’s gone, It’s gone forever”-Show the importance of Valuing Time.	2	K2	CO1
3.	Distinguish between Consensus and Controversy.	2	K3	CO2
4.	Name any Two Professional Virtues.	2	K1	CO2
5.	Determine the need of Research ethics.	2	K1	CO3
6.	Mention the Aspects of Industrial Standards.	2	K2	CO3
7.	Recall any Daily Life Incident involving Voluntary Risks.	2	K1	CO4
8.	Inspect the Purpose of Trademark.	2	K3	CO4
9.	Outline the Challenges of Professional Ethics due to Globalization.	2	K2	CO5
10.	How Adulterated Drugs cause Mass Poisoning?	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11. a)	How Service Learning and Civic Virtue ensure Citizen's involvement in Society and encourage Civic Engagement by knowing the needs of Other? Elucidate with example.	13	K2	CO1
	(OR)			
b)	“Both Character and Spirituality of Leaders can help them in managing People and making their Ethical Decisions.”-Justify.	13	K4	CO1
12. a)	Compare and Contrast Gilligan's Theory and Kohlberg's Theory of Moral Development.	13	K3	CO1
	(OR)			
b)	Discuss the Types of Complexities in arriving at a Decision due to Moral Dilemmas and Elaborate the steps in facing Moral Dilemmas.	13	K2	CO1
13. a)	“The complication in accepting one's Moral Accountability is further worsened due to the Modern Engineering Practices.”- Evaluate the Statement with Features of Moral Responsible Engineers.	13	K5	CO1
	(OR)			
b)	Critically analyze the Roles and Functions of Codes of Ethics with its Limitations.	13	K3	CO1
14. a)	Illustrate the Stages involved in the Safety Assessment Process and Defend Fault tree Analysis as a Risk Analysis Tool.	13	K2	CO1
	(OR)			
b)	Is Chernobyl the Worst Nuclear Disaster ever? What are the Ethical Issues in Chernobyl Disaster? Discuss in detail with its Causes and Effects.	13	K6	CO1
15. a)	How to prevent the Unethical usage of Computers and Networks through IT Act in India? Enumerate the Types of Computer Crimes with their impact.	13	K3	CO1
	(OR)			
b)	Why Weapon Development ethics is vital for Engineers? Interpret the Principles of Research Ethics and Examine the Ethical Issues in Research and Publication.	13	K2	CO1

PART – C

(1 x 15 = 15 Marks)

Q.No.	Questions	Marks	KL	CO
16. a)	Ranbir is the Chief executive officer of a company. The Company has been growing and has recruited quite a few specialists recently. The functional heads in the company have to meet their staff in an open meeting every two months. Ranbir detested these meetings. It was open to everyone in the office. The staff came up with a long list of trivial and tiresome complaints and grievances. They repeated the same things and spoke at length. Even when the staff knew of the constraints, they went on with their complaints. They wanted more space for lounge, for bathrooms and crèche. Ranbir pointed to lack of space, and yet the staff continued to complain. Ranbir cultivated a habit of sitting through the meeting with a cheerful face, but with his mind switched off from the proceedings. The meeting became a tiresome ritual he had to get through. Due these issues many employees had left the company and its further hampering the Business of the company.	15	K3	CO4

Questions:

- i. What are the ethical issues involved and the options available to Ranbir in the above Case?
- ii. In Ranbir's situation what action would you have taken and why?

(OR)

b)	You are a Municipal Corporation Commissioner of your city which is under heavy rainfall over the last few days. The boundary wall of one of the housing society collapses. The incident took place at midnight, leading to the death of 12 workers, including two children, sleeping in the shade beside the wall. On the preliminary inquiry, it has been found that in spite of inappropriate soil conditions, the permission to construct wall was given by previous Municipal Commissioner, who happens to be your close friend. Also, irregularities in construction material have been found and the other officials in the department are trying to influence or manipulate you. The whole scenario seems like a nexus between the officials of the municipal department and builder. However, the builder is a close relative of one of the most powerful leaders of the party in power and is trying to threaten you.	15	K3	CO2
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Questions:

- i. What are the ethical issues involved and the options available to you in such a situation?
- ii. Also, suggest a course of action you would like to follow.

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Question Paper Code: 7036

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – JUNE 2023

Third Semester

Information Technology

U19EC308 – ELECTRONIC DEVICES AND CIRCUITS

(Regulation 2019)

Time: Three Hours

Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	What is meant by avalanche breakdown?	2	K2	CO1
2.	Define cut-in voltage of a diode and specify the values of cut in voltage for Si and Ge diodes.	2	K1	CO1
3.	Write the differences between Transistor CE, CB and CC configurations.	2	K2	CO2
4.	How transistor works as an amplifier?	2	K2	CO2
5.	Why BJTs are called as bipolar devices while FETs are called as unipolar devices.	2	K2	CO3
6.	Draw the drain and transfer characteristics of an N-channel enhancement-MOSFET.	2	K1	CO3
7.	Give the applications of UJT.	2	K2	CO4
8.	Explain working of photovoltaic cell.	2	K2	CO4
9.	What is the need of filter in power supplies?	2	K2	CO5
10.	Draw the functional block diagram of a switch mode power supply.	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11. a)	i. With neat sketch explain the VI characteristics of a PN Junction diode.	8	K2	CO1
	ii. Derive the expression for total current passing through a PN junction diode.	5	K3	CO1
(OR)				
b)	i. With neat sketch explain the VI characteristics of a Zener diode.	8	K2	CO1
	ii. Explain the difference between ordinary PN junction diode and zener diode, and also explain zener break down.	5	K2	CO1
12. a)	Draw and explain the BJT common base static characteristics and explain the Early effect on these characteristics.	13	K3	CO2
(OR)				
b)	With Neat Sketch explain the input and output characteristics of common emitter transistor configuration and also indicate operating regions of the transistor on output characteristics.	13	K3	CO2
13. a)	i. With neat sketch explain the construction of JFET.	5	K2	CO3
	ii. With the help of neat sketches and characteristic curves explain the operation of JFET.	8	K3	CO3
(OR)				
b)	With neat sketches construction, operation and characteristics of depletion type MOSFET.	13	K2	CO3
14. a)	i. Draw and explain the working of a two transistor model of SCR.	7	K3	CO4
	ii. Explain the VI characteristics of SCR.	6	K2	CO4
(OR)				
b)	i. With neat diagram explain the construction and operation of PIN diode.	5	K2	CO4
	ii. Explain the VI characteristics of tunnel diode by using energy band diagrams.	8	K3	CO4
15. a)	i. With the help of circuit diagram and waveforms, explain the operation of a Bridge rectifier.	8	K3	CO5
	ii. Explain how zener diode work as a voltage regulator.	5	K3	CO5
(OR)				

- | | | | | | |
|----|-----|---|---|----|-----|
| b) | i. | With the help of circuit diagram and waveforms, explain the operation of a half wave rectifier. | 7 | K3 | CO5 |
| | ii. | Explain working of a 78 series fixed positive IC voltage regulators. | 6 | K2 | CO5 |

PART – C

(1 x 15 = 15 Marks)

Q.No.	Questions	Marks	KL	CO	
16. a)	i.	Derive the expressions for width of the depletion region and transition capacitance of a diode.	10	K4	CO1
	ii.	A BJT whose emitter current is fixed at 1 mA has a base – emitter voltage of 0.69 V at 25° C. What base – emitter voltage would you expect at 0° C? At 100° C?	5	K4	CO2
	(OR)				
b)	i.	The current I_{CBO} of a small transistor is measured to be 20nA at 25° C. If the temperature of the device is raised to 85° C, What do you expect I_{CBO} to become?	5	K4	CO2
	ii.	A single-phase full-wave rectifier use semiconductor diodes. The transformer voltage is $6V_{rms}$ to center tap. The load consists of a $40\mu F$ capacitor in parallel with a 250Ω resistor. The diode and the transformer resistances and leakage reactance may be neglected. Assume that the power-line frequency is 50Hz. Calculate	10	K4	CO5
		1. The dc current I_{dc} in the circuit.			
		2. Peak-to-peak amplitude of the ripple voltage $[V_r]$.			
		3. Ripple factor of a rectifier-filter output $[\gamma]$.			

