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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: 6001

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

Eighth Semester

Information Technology

U19ITE24 – SOFTWARE PROJECT MANAGEMENT

(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.	In what way do projects differ from jobs, and Also write one way in which projects differ from exploration activities.	2	K1	CO1
2.	Identify at least two significant factors that make managing software projects much more challenging as compared to managing a similarly budgeted road construction project.	2	K4	CO1
3.	Name at least two popular metrics to measure project size.	2	K1	CO1
4.	Briefly explain why discounted cash flow technique provides better criteria for project selection than net profit or return on investment.	2	K4	CO2
5.	Briefly explain why adding more man power to an already late project makes it later.	2	K2	CO3
6.	Why is performing effective work breakdown important to the success of a project? To what granularity level should the identified work be broken down?	2	K2	CO4
7.	For removing bugs from code, would review or testing be more cost-effective? Briefly explain the reason behind your answer.	2	K3	CO4
8.	Write down the main difference between open tendering and restricted tendering. Write one important advantage of open tendering and that of restricted tendering.	2	K2	CO2
9.	Briefly distinguish between McGregors' Theory X and Theory Y and explain how can you infer whether the manager of a software development organization espouses McGregors' Theory X or Theory Y.	2	K2	CO5
10.	Briefly explain what is the Taylor's view point of motivating people. Why is it hard to put this into practice in software industry?	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11. a)	Identify and write the main activities that need to be performed by a project manager during project planning process.	13	K2	CO1
	(OR)			
b)	Distinguish among the principal project bidding techniques: RFQ, RFP and RFI. Explain using suitable example the applicability of each.	13	K3	CO2
12. a)	What is the order in which the following are estimated in the COCOMO estimation technique: cost, effort, duration, size? Represent the precedence ordering among these activities using a task network diagram.	13	K3	CO2
	(OR)			
b)	Identify three important shortcomings of the LOC metric that FP (Function Point) metric overcomes. Briefly explain how exactly FP metric overcomes these short comings of the LOC metric.	13	K4	CO2
13. a)	List three common types of risks that a typical software project might suffer from. Explain how you can identify the risks that your project is susceptible to.	13	K3	CO3
	(OR)			
b)	Consider a software project with 5 tasks T1–T5. Duration of the 5 tasks in weeks are 3,2,3,5,2 respectively. T2 and T4 can start when T1 is complete. T3 can start when T2 is complete. A T5 can start when both T3 and T4 are complete. Draw the PERT chart representation of the project. When is the latest start date of the task T3. What is the slack time of the task T4. Which tasks are on the critical path?	13	K3	CO4
14. a)	What are the major types of contracts that can be entered with the vendor of a software service provider based on payments to be made to the vendor for the completed work. If you are trying to enter into a contract with a vendor for maintaining a legacy software that your company uses, discuss the pros and cons of each type of the contract you have identified.	13	K4	CO2
	(OR)			
b)	Suppose you are the project manager of a project that has been budgeted to cost Rs. 10,000,000. It is estimated that your team of programmers will work for six month for a total of 10,000 hours. According to the project schedule, your team should be done with 30% of the work by now. As of today, the project is 40% complete while 50% budget has been used. Compute PV (planned	13	K3	CO4

value), EV (earned value), CPI (cost performance index) , and SV (Schedule variance). Interpret the computed values to assess the progress of the project.

15. a) A software development organization wants to improve programmer productivity by reusing existing software components and plans to initiate a financial reward scheme for reuse. Examine whether this scheme can be successful in increasing productivity. Suggest a modified scheme that can be more successful. You may consider Maslow's hierarchy of needs and expectancy theory of motivation to answer this question.
- 13 K3 CO5

(OR)

- b) Suppose you are the project manager of a small team that has been entrusted to develop a business application. Assume that your team has experience in developing several similar products. If you are asked to make a choice between democratic and chief programmer team organizations, which one would you adopt for your team? Explain the reasoning behind your answer.
- 13 K3 CO5

PART – C

(1 x 15 = 15Marks)

Q.No.	Questions	Marks	KL	CO
16. a)	<p>A college intends to automate the routine activities of its library including issuing books to users, book return, handling fine collection, and querying availability of books. The library has about 10,000 books. At present, the activities of the library is being carried out manually by four library staff. The college intends to award the work of developing the software to a vendor. The software would have to be installed in the library in the fully operational mode. To speed up the delivery of software, the vendor would have to create the operational database during the development of the software. This would involve entering the details of the existing books into a CSV (comma separated values) file. After development of the software, the CSV data needs to be imported into the software. After alpha testing, the software would have to be tested in the operational environment. For this, the software would have to be run along side the manual system at the library for a week. During this time, user training would also have to be conducted.</p> <p style="margin-left: 20px;">i. Identify and represent the deliverables using a product breakdown structure (PBS).</p> <p style="margin-left: 20px;">ii. Identify and represent the work pieces using a Work Breakdown Structure (WBS).</p> <p style="margin-left: 20px;">iii. Develop an activity network based on the WBS.</p>	15	K3	CO4

(OR)

b) The specification of an IT application is estimated to take two weeks to complete. When the specification activity has been completed, work can start on three software modules, A, B and C. Design/coding of the three modules will need 5, 10 and 10 days respectively. Modules A and B can only be unit -tested together as their functionality is closely associated. This joint testing of the modules A and B should take about two weeks. Module C will need eight days of unit testing. When all unit testing has been completed, integrated system testing will take a further three weeks. System testing will be based on the functionality described in the specification and will need 10 days of planning. Develop the activity network representation for the project, and derive the earliest and latest start dates for each activity and the earliest and latest finish dates. Work out the shortest project duration

15

K3

CO4

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Question Paper Code: 6002

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

Eighth Semester

Information Technology

U19ITE30 – TOTAL QUALITY MANAGEMENT

(Regulation 2019)

Time: Three Hours

Maximum: 100 Marks

Answer ALL the questions

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

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	State the quality improvement strategy?	2	K1	CO1
2.	Quote any Two examples for Customer Focus.	2	K2	CO1
3.	What is meant by Crosby's quality vaccine?	2	K1	CO2
4.	Infer the Objectives of Quality Circle.	2	K2	CO2
5.	What is Process Capability Index?	2	K1	CO3
6.	Examine the main Purpose of Control Chart.	2	K3	CO3
7.	Defend Voice of Customer as a Tool for Continuous Improvement.	2	K3	CO4
8.	Throw Light on 80-20 Rule of Pareto Analysis.	2	K1	CO4
9.	Define Quality Audit.	2	K1	CO5
10.	Interpret the Functions of Quality Council.	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11. a)	What are Obstacles in TQM? Illustrate the Key Elements of TQM.	13	K2	CO1
	(OR)			
b)	How to improve Internal Customer Satisfaction? Examine the Factors influencing the Customer Perception of Quality.	13	K4	CO1
12. a)	Elaborate the Quality Management Approaches of Deming and Juran.	13	K6	CO2

	(OR)			
	b) Determine the need and importance of 5S principles in the workplace and Explain Taguchi's Signal-to-Noise Ratio Approach.	13	K2	CO2
13.	a) How can Statistical Process Control be used to improve Performance? Critically analyze the Application of Statistical Process Control in Product and service Industry.	13	K3	CO3
	(OR)			
	b) Describe Reliability in Series and Parallel. Also Evaluate the Pillars of Total Productive Maintenance.	13	K3	CO3
14.	a) Design and Perform a House of Quality Analysis for an Air Conditioner of any Brand.	13	K6	CO4
	(OR)			
	b) Appraise Seven New Management Tools of TQM with their Applications.	13	K5	CO4
15.	a) How ensure that ISO 9004:2000 Standard meet all requirements of Customers? Interpret the elements and requirements of a Quality Management System.	13	K2	CO5
	(OR)			
	b) Outline the Principles of BPR and Elaborate the Steps involved in the Implementation of Business Process Reengineering.	13	K2	CO5

PART – C

(1 x 15 = 15Marks)

Q.No.	Questions	Marks	KL	CO
16. a)	You have recently joined as Manager, Quality Control in a leading Electric Car manufacturing Factory, near Chennai established in 2017. Now (as instructed by your GM) design, construct, display and submit a model House Of Quality (HOQ) as a Report for your Firm for its new 'single battery car' Model to be released in 2022. Your HOQ Report on the new Model Car must incorporate the HOQ steps, stages and methods with suitable diagrams, to enable and Implement the QFD concept successfully.	15	K3	CO4
	(OR)			
b)	Assume your new role as Manager for Quality Development in a premier PC and Laptop manufacturing Company at Bangalore, where in your CEO has recently Instructed you to submit a report on enabling, establishing and conducting innovative Quality Circle (QC) programs in your firm. As required, submit a comprehensive Action Plan Report on QC suggesting at least two ideal QC programs for your Firm, duly highlighting the nature of the problems, QC Teams design, scouting for right solutions and implementation steps. Relevant data if necessary can be assumed.	15	K5	CO2

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Question Paper Code: 6003

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

Sixth Semester

Information Technology

U19IT621 – COMPUTER COMMUNICATION NETWORKS

(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

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	State the purpose of virtual circuit network.	2	K1	CO1
2.	What are the transmission modes for transfer of data between two devices?	2	K2	CO1
3.	What is vulnerable period? How it affects the performance in MAC protocols?	2	K2	CO2
4.	Why do you require a limit on the minimum size of Ethernet frame?	2	K3	CO2
5.	Where is the special IP address 127.0.0.0. used ?	2	K2	CO3
6.	What are the characteristics that measure the performance of the network?	2	K4	CO3
7.	Compare the maximum window size in go-back-N and selective-repeat ARQs.	2	K2	CO4
8.	What are end-to-end protocols?	2	K3	CO4
9.	Subnet the class C network address 198.67.25.0 into eight subnets. Why are the 'all ones' and 'all zeroes' subnets not used?	2	K5	CO5
10.	What is the purpose of TELNET ?	2	K6	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11. a)	i. Describe and distinguish between FDM, WDM, and STDM.	8	K1	CO1
	ii. Explain the responsibilities of Physical layer.	5	K2	

		(OR)			
	b)	i. Explain FHSS and DSSS.	8	K2	CO1
		ii. Explain TCP/IP protocol suite.	5	K1	
12.	a)	i. What is the CRC checksum of the following message (10010110), using a CRC generator polynomial of $x^3 + 1$? Show your working.	8	K3	
					CO2
		ii. What is the need of Layer 3 addressing if there is Layer 2 addressing? And what is the need of Layer 2 addressing if there is Layer 3 addressing in a network?	5	K4	
		(OR)			
	b)	i. Explain the role of ARP. Why is an ARP query sent within a broadcast frame? Why is an ARP response sent within a frame with a specific destination MAC address?	8	K2	
					CO2
		ii. Describe CSMA/CD protocol in Ethernet.	5	K2	
13.	a)	i. Explain the behavior of link state protocols and illustrate your answer by reference to the OSPF protocol.	8	K3	
					CO3
		ii. What do you mean by unicast routing?	5	K1	
		(OR)			
	b)	i. Compare IPv4 header with IPv6 header. Give diagrams of each explaining its fields.	7	K3	
					CO3
		ii. Discuss ICMPV4 protocol.	6	K2	
14.	a)	i. Compare GBN (Go-Back-N), SR (Selective Repeat) and TCP (with no delay ACK). Assume that the timeout values for all three protocols are sufficiently long such that 5 consecutive data segments and their corresponding ACKs can be received (if not lost in the channel) by the receiving host (Host B) and the sending host (Host A) respectively. Assume each data segment has 1000 bytes of data. Suppose host A sends 5 data segments to host B, and the 2nd segment (sent from A) is lost. In the end, all 5 data segments are correctly received by Host B. How many segments does host A send in total and how many ACKs does host B send in total? What are their sequence numbers and acknowledgement numbers?	8	K5	
					CO4
		ii. The TCP sets retransmission timeouts based on network round-trip time (RTT) measurements and timeout values have a large impact on performance. What happens if the timeout is set too low? What happens if it is set too high?	5	K6	
		(OR)			

	b)	i.	Distinguish between TCP and UDP in detail and explain segment structure of each.	8	K2	CO4
		ii.	Describe the techniques to improve QoS.	5	K3	
15.	a)	i.	Explain the functions of Session, Presentation and Application Layer.	8	K1	
		ii.	Discuss about SNMP and its message types.	5	K4	CO5
(OR)						
	b)	i.	Explain the working of Telnet and discuss the potential security risks associated with using Telnet.	7	K5	
		ii.	Explain what Software-Defined Networking (SDN) is and how it works? Discuss its benefits and drawbacks.	6	K5	CO5

PART – C

(1 x 15 = 15Marks)

Q.No.	Questions	Marks	KL	CO
16.	a) i. The following character encoding is used in a data link protocol: A: 01000111; B: 11100011; FLAG: 01111110; ESC: 11100000 Show the bit sequence transmitted (in binary) for the four-character frame: AB ESC FLAG when each of the following framing methods are used: 1. Character Count 2. Flag bytes with byte stuffing 3. Starting and ending flag bytes, with bit stuffing.	10	K3	CO2
	ii. How transport layer connection is established in TCP? Illustrate with state diagrams.	5	K5	CO2
(OR)				
	b) i. Consider sending a 1500-byte TCP datagram into a link that has an MTU of 500 bytes. Suppose that the original datagram is stamped with the identification number 225 of IP header. Assume that IPv4 is used, but not ICMP. (Hint: The IPv4 header is 20 bytes long). 1. Workout the number of fragments that are generated for this transmission. Show how you worked out using one general block diagram. 2. Using the answers given to the questions a, b, and c show the process of fragmentation in sending the 1500-byte datagram down the link. Use diagrams to show the steps.	12	K5	CO3
	ii. Briefly discuss on piggybacking	3	K4	CO4

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Question Paper Code: 6010

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

Sixth Semester

Information Technology

U19IT619 – INTRODUCTION TO MACHINE LEARNING

(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.	Illustrate the evolution of artificial intelligence techniques using a timeline diagram	2	K1	CO1
2.	Mention one application for each of supervised learning, unsupervised learning and reinforcement learning.	2	K1	CO2
3.	What is discrete distributions and continuous distribution?	2	K1	CO2
4.	What is ROC curve?	2	K1	CO3
5.	What is a support vector?	2	K1	CO4
6.	Why is naive bayesian classification called “naive”?	2	K1	CO3
7.	What is regression analysis?	2	K1	CO4
8.	How can a polynomial regression model be transformed to a linear regression model?	2	K1	CO4
9.	What are the different types of clustering techniques?	2	K1	CO5
10.	What are frequent itemsets and closed itemsets?	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

- | Q. No. | Questions | Marks | KL | CO |
|--------|---|-------|----|-----|
| 11 a) | Explain the different types of machine learning techniques and mention the algorithms used in each type.
(OR) | 13 | K2 | CO2 |
| b) | Explain the symbolic and non-symbolic representation in artificial intelligence. | 13 | K2 | CO1 |
| 12 a) | Explain the various measures for calculating the accuracy of classifiers and error of predictors.
(OR) | 13 | K4 | CO3 |
| b) | Show that accuracy is a function of sensitivity and specificity. | 13 | K4 | CO3 |
| 13 a) | The following table consists of training data from an employee database. The data have been generalized. For example, “31 . . . 35” | 13 | K4 | CO3 |

<i>department</i>	<i>status</i>	<i>age</i>	<i>salary</i>	<i>count</i>
sales	senior	31...35	46K...50K	30
sales	junior	26...30	26K...30K	40
sales	junior	31...35	31K...35K	40
systems	junior	21...25	46K...50K	20
systems	senior	31...35	66K...70K	5
systems	junior	26...30	46K...50K	3
systems	senior	41...45	66K...70K	3
marketing	senior	36...40	46K...50K	10
marketing	junior	31...35	41K...45K	4
secretary	senior	46...50	36K...40K	4
secretary	junior	26...30	26K...30K	6

Let *status* be the class label attribute.

for age represents the age range of 31 to 35. For a given row entry, count represents the number of data tuples having the values for department, status, age, and salary given in that row.

Given a data tuple having the values “systems,” “26. . . 30,” and “46–50K” for the attributes department, age, and salary, respectively, what would a naive bayesian classification of the *status* for the tuple be?

(OR)

- b) The support vector machine (SVM) is a highly accurate classification method. However, SVM classifiers suffer from slow processing when training with a large set of data tuples. Discuss how to overcome this difficulty and develop a scalable SVM algorithm for efficient SVM classification in large datasets. 13 K4 CO3
- 14 a) The following table shows the midterm and final exam grades obtained for students in a database course. 13 K2 CO4

<i>x</i>	<i>y</i>
<i>Midterm exam</i>	<i>Final exam</i>
72	84
50	63
81	77
74	78
94	90
86	75
59	49
83	79
65	77
33	52
88	74
81	90

Use the method of least squares to find an equation for the prediction of a student's final exam grade based on the student's midterm grade in the course.

(OR)

- b) The dataset of pass / fail in an exam for 5 students is given in the table below. K3 CO3

Hours Studied	Result (1 = Pass, 0 = Fail)
29	0
15	0
33	1
28	1
39	1

If we use logistic regression as the classifier and assume the model suggested by the optimizer will become the following for odds of passing a course:

$$\log(\text{odds}) = -64 + 2 * \text{hours}$$

- i. Calculate the probability of pass for the student who studied 33 hours. 6
- ii. At least how many hours the student should study that makes sure will pass the course with the probability of more than 95%? 7

- 15 a) A database has five transactions. Let min sup = 60% and min conf = 80% 13 K2 CO5

TID	items_bought
T100	{M, O, N, K, E, Y}
T200	{D, O, N, K, E, Y}
T300	{M, A, K, E}
T400	{M, U, C, K, Y}
T500	{C, O, O, K, I, E}

Find all frequent itemsets using apriori.

(OR)

- b) Describe *k-medoids* clustering algorithms in terms of the shapes of clusters that can be determined, input parameters that must be specified, and limitations. 13 K2 CO5

PART – C

(1 x 15 = 15 Marks)

- | Q. No. | Questions | Marks | KL | CO |
|--------|---|-------|----|-----|
| 16 a) | Consider the following dataset. <i>weight</i> , <i>height</i> are called features and <i>class</i> is called target or label. For the given data instance (57, 170), apply <i>K – nearest neighbour</i> algorithm to classify whether the given instance belongs to underweight or normal. Assume $K = 3$. | 15 | K3 | CO3 |

Weight	Height	Class
51	167	Underweight
62	182	Normal
69	176	Normal
64	173	Normal
65	172	Normal
56	174	Underweight
58	169	Normal
57	173	Normal
55	170	Normal

(OR)

- b) For preparation of the exam, a student knows that one question is to be solved in the exam which is either of types A, B, or C. The probabilities of A, B, or C appearing in the exam are 30%, 20%, and 50% respectively. During the preparation, the student solved 9 of 10 problems of type A, 2 of 10 problems of type B, and 6 of 10 problems of type C. 15 K3 CO2
- i. What is the probability that the student will solve the problem of the exam?
 - ii. Given that the student solved the problem, what is the probability that it was of type A?

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Question Paper Code: 6004

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

Fourth Semester

Information Technology

U19IT407 – LINEAR INTEGRATED CIRCUITS

(Regulation 2019)

Time: Three Hours

Maximum: 100 Marks

Answer ALL the questions

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

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Recall the ideal characteristics of basic operational amplifier.	2	K1	CO1
2.	List the DC characteristics of operational amplifier.	2	K1	CO1
3.	Calculate feedback resistance of an operational amplifier with a gain of -5 and input resistance 10K Ω .	2	K3	CO1
4.	Sketch the circuit of opamp voltage follower and mention its importance.	2	K1	CO1
5.	Define trans-conductance of amplifier.	2	K1	CO2
6.	List the applications of analog multiplier IC.	2	K1	CO2
7.	Which is fastest ADC? How is it fast?	2	K2	CO3
8.	Determine the time taken to convert 8 bit digital data into analog voltage using SAR and counter ADC with the clock frequency of 1 KHz.	2	K3	CO3
9.	Mention any four features of ICL8038 IC.	2	K3	CO4
10.	Sketch the circuit of monolithic switching regulator.	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11. a)	Sketch the circuit of a Widlar current mirror and derive the expression for its output current. Mention the importance of current mirrors.	13	K2	CO1

(OR)

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|-----|--|----|----|-----|
| | b) Identify any two AC performance characteristics of Operational amplifiers. Explain the characteristics with suitable circuits | 13 | K2 | CO1 |
| 12. | a) Derive an expression for output voltage of differentiator and integrator using operational amplifier. | 13 | K3 | CO1 |

(OR)

- | | | | | |
|-----|---|----|----|-----|
| | b) State the importance of instrumentation amplifiers in medical industry. With neat sketch, explain the working of instrumentation amplifier. Also derive output expression. | 13 | K3 | CO1 |
| 13. | a) Describe the function of analog multiplier using emitter coupled transistor pair and discuss the construction of Gilbert multiplier cell in detail. | 13 | K2 | CO2 |

(OR)

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|-----|--|----|----|-----|
| | b) What are the internal blocks of PLL? Explain the operation of basic PLL and discuss any two applications in detail. | 13 | K2 | CO2 |
| 14. | a) Explain the working of voltage and current mode R-2R ladder type D/A Converters with suitable expressions. Compare their conversion efficiency. | 13 | K2 | CO3 |

(OR)

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|-----|--|----|----|-----|
| | b) With a suitable example, explain the working of successive approximation A/D converter. Compare the conversion times of tracking and successive approximation ADCs. | 13 | K2 | CO3 |
| 15. | a) Demonstrate the production of square and triangular waves using operational amplifiers with suitable circuits. Explain its operation in detail. | 13 | K2 | CO4 |

(OR)

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|--|--|----|----|-----|
| | b) Discuss the role of IC 723 as low voltage and high voltage regulator with appropriate circuits and expressions. | 13 | K2 | CO5 |
|--|--|----|----|-----|

PART – C

(1 x 15 = 15Marks)

- | Q.No. | Questions | Marks | KL | CO |
|-------|---|-------|----|-----|
| 16. | a) Design II order Butterworth active band pass filters with a lower cut off frequency of 200Hz and higher cut off frequency of 1KHz. | 15 | K6 | CO1 |

(OR)

- | | | | | |
|--|--|----|----|-----|
| | b) Calculate free running frequency, lock range and capture range of PLL IC whose external timing resistor, $R_T = 15K\Omega$, external timing capacitor, $C_T = 0.01\mu F$, filter capacitor, $C_2 = 1\mu F$ and supply voltage $\pm 6V$. Sketch the block diagram of PLL IC 565 with the above external components to operate as phase locked loop. | 15 | K5 | CO2 |
|--|--|----|----|-----|

Reg.No.:



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

Question Paper Code: 6007

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

Fourth Semester

Information Technology

U19IT410 – DATABASE MANAGEMENT SYSTEMS

(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.	List various users of DBMS and specify their roles.	2	K2	CO1
2.	State the advantages of DBMS over file system.	2	K1	CO2
3.	Give example for select and project operations of Relational Algebra.	2	K2	CO2
4.	List various DDL commands.	2	K2 K3	CO2
5.	State the need for Query Optimization.	2	K3	CO3
6.	What is a join operation?	2	K2	CO2
7.	State the ACID properties.	2	K1	CO1
8.	When is a schedule said to be serializable?	2	K4	CO2
9.	What is static hashing?	2	K2	CO1
10.	List the various RAID levels.	2	K2	CO2

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11. a)	i. Explain the concept of a data model.	6	K1	CO1
	ii. Explain the data models that are used in database management systems.	7	K2	CO2
	(OR)			
b)	i. Discuss about the Concept Design with the ER Model.	7	K3	CO2
	ii. Differentiate between logical database design and physical database design.	6	K2	
12. a)	i. Define functional dependencies. How are primary keys related to FDs.	7	K1	CO4
	ii. Why are some functional dependencies trivial?	6	K3	
	(OR)			
b)	i. Compare and contrast BCNF with 3NF.	7	K3	CO3
	ii. Explain 1NF and 2NF with an example.	6	K2	
13. a)	i. Explain the nested loop join algorithm.	6	K1	CO4
	ii. Illustrate Group by and Having clauses with examples.	7	K4	
	(OR)			
b)	Consider the following database schemas and write SQL statements for the queries given below: Sailors (sid; sname, rating, age) Boats (bid, bname, color) Reserves (sid, bid, reservation date)			
	i. Write a nested query to find the names of sailors who have reserved both a red and green boat.	6	K4	CO5
	ii. Write a nested query to find the names of sailors who have reserved all boats.	7	K5	
14. a)	i. Illustrate Concurrent execution of transaction with examples.	6	K3	CO4
	ii. Describe Timestamp based locking protocols.	7		
	(OR)			
b)	i. Explain different types of Advanced Recovery Techniques.	6	K2	CO3
	ii. Write in detail about Remote Backup systems.	7	K3	
15. a)	i. Write in detail about Hash based Indexing and Tree based Indexing.	7	K3	CO3
	ii. Compare I/O costs for all File Organizations.	6		
	(OR)			
b)	i. Demonstrate searching a given element in B+ trees.	6	K3	
	ii. Illustrate insertion and deletion of an element in B+ trees with example.	7	K4	CO4

PART – C

(1 x 15 = 15Marks)

Q.No.	Questions	Marks	KL	CO
16. a)	<p>Consider the transactions t_1, t_2 and t_3 and a schedule S given below.</p> <p>S : $read_1(A)$; $read_2(B)$; $write_1(C)$; $read_3(B)$; $read_3(C)$; $write_2(B)$; $write_3(A)$ Where the subscript denotes the transaction number. Assume that the time stamp of $t_1 < t_2 < t_3$. Using time-stamp ordering scheme for concurrency control find out if the schedule will go through. If there is to be a rollback, which transaction(s) will be rolled back?</p>	15	K2 K3	CO3
	(OR)			
b)	<p>Consider the following relational database schema consisting of the four relation schemas:</p> <p>passenger (pid, pname, pgender, pcity) agency (aid, aname, acity) flight (fid, fdate, time, src, dest) booking (pid, aid, fid, fdate)</p> <p>Answer the following questions using relational algebra queries;</p> <ol style="list-style-type: none"> Get the complete details of all flights to New Delhi. Get the details about all flights from Chennai to New Delhi. Find only the flight numbers for passenger with pid 123 for flights to Chennai before 06/11/2023. Find the passenger names for passengers who have bookings on at least one flight. Find the passenger names for those who do not have any bookings in any flights. Find the agency names for agencies that located in the same city as passenger with passenger id 123. Get the details of flights that are scheduled on both dates 01/12/2020 and 02/12/2023 at 16:00 hours. Get the details of flights that are scheduled on either of the dates 01/12/2023 or 02/12/2023 or both at 16:00 hours. 	15	K2 K3	CO4

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Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 6009

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

Fourth Semester

Information Technology

U19IT409 - DESIGN AND ANALYSIS OF ALGORITHMS

(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 the recurrence relation to state the time complexity for Binary Search Algorithm.	2	K2	CO1
2.	Solve the following recurrence: $T(n) = T(n-1)+1$	2	K2	CO1
3.	Find the best case and worst case time complexity of Quick sort Algorithm that uses divide and conquer strategy.	2	K3	CO2
4.	Give an example of a Greedy Algorithm used for Graphs	2	K3	CO2
5.	Give an example of a Dynamic Programming based Algorithm. Write one difference between Greedy and Dynamic Programming.	2	K3	CO2
6.	Apply 0/1 knapsack dynamic programming approach on the following items(weight,profit): item1(2,3); item2(3,2); item3(4,6); item4(5,5). What will be the result? (Capacity of knapsack is 7)	2	K3	CO3
7.	What is the time complexity of a backtracking algorithm to find a Hamiltonian cycle in a n-vertex graph?	2	K2	CO4
8.	What is the minimum number of colours required to color the nodes of a k-ary tree such that no adjacent vertices get the same colour?	2	K2	CO4

9. We want to check satisfiability of Boolean formula of this form, where, j can be either 1 or 2; and $L_{i,j}$ is a variable or complement of it. 2 K3 CO5

$$A = \bigwedge_{i=1 \dots n} \bigvee_j L_{i,j}$$

- Is this problem a P or NP?
10. Give an example of an NP Complete problem. 2 K3 CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11. a)	i. Solve the recurrence: $T(n) = 2T(\sqrt{n}) + \log n$	7	K4	
	ii. State the general plan for analyzing the time efficiency of non recursive algorithms and explain with an example.	6		CO1
(OR)				
b)	i. Solve the following recursion: $T(n) = 4T(n/2) + n^2$	6	K3	
	ii. 3-way merge sort is applied on the following elements to sort them in ascending order: -1, -3, 3, 2, 0, 4, 1, 5, 3, 2, 0, 6, 2	7	K3	CO1
Show the content of the list in each pass till it gets sorted. What is the complexity of merge sort?				
12. a)	i. A complete undirected weighted bipartite graph G is given on the vertex set $\{1, 2, \dots, N\}$, where N is even and the partite sets are $\{1, 3, 5, \dots, N-1\}$ and $\{2, 4, 6, \dots, N\}$. The weights of the edge $E(i, j)$ between vertices i and j is defined as $ i - j $. 1. Write an algorithm to find minimum spanning tree of the above graph. 2. Find the total weight of the spanning tree.	8	K3	CO2
	ii. A greedy algorithm is used for Huffman code construction for the following characters with given frequencies: A – 8, B – 3, N – 4, E – 2, M – 2, K – 3, S – 6 1. What is the code for BANANA? 2. Write the important features of Dynamic Programming. 3. How do you analyze the complexity of a dynamic programming based algorithm?	5	K4	

(OR)

- b) i. Consider the following divide-conquer based recursive function for implementing Quick Sort technique to arrange a list of elements in ascending order. 8 K3

```
void quicksort(int a[], int low, int high )
{
    int pivot;
    if ( high > low )
    {
        pivot = partition(a, low, high );
        quicksort(a, low, pivot-1 );
        quicksort(a, pivot+1, high );
    }
}
```

The partition function partitions the array of elements into two parts and returns the position of the pivot element in the array. After partition, the left part of the array will contain elements with values \leq the value in the pivot element and the right part of the array will contain the elements with values $>$ the value in the pivot element. (Consider, both pivot and low are initialized to the index of the first element and high is initialized to the index of last element)

Clearly show the iterations to sort the following elements in ascending order using Quick sort technique:

45, -56, 78, 90, -3, -6, 45

How many times partition function will be called?

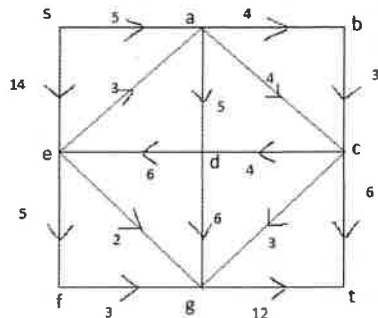
- ii. Explain how do you analyze complexity of a divide-conquer based algorithm. 5 K4 CO2
13. a) Construct the optimal binary search tree for the following table using dynamic Programming. 13 K3 CO3

Key	A	B	C	D
probability	0.1	0.2	0.4	0.3

(OR)

- b) i. Consider a round-robin chess tournament with n players with each player playing every other player exactly once. A win scores 1 point for the winner and 0 points for the loser, while a draw scores $\frac{1}{2}$ points for each player. We are given a set of final scores (S_1, \dots, S_n) for the players with $0 \leq S_i \leq n - 1$. We want to check whether these scores are feasible [for example, in a three - player tournament, a set of final scores of $(2, \frac{1}{2}, 2)$ is impossible.]. Write an algorithm for this checking. 10 K3 CO3
- ii. Analyze the complexity of your algorithm 3

14. a) i. Explain the working procedure of a backtracking algorithm with a detailed example. 8 K3
 ii. Find the maximum s-t flow in the given network. 5 K4 CO4



(OR)

- b) i. Describe N-Queen puzzle problem. Explain a solution to this problem. 10 K2
 ii. In a weighted, undirected graph, we apply Dijkstra's algorithm to find the shortest path between two nodes. If we add 1 to all the edge weights, the shortest path may not remain same as the shortest path in the original graph. Reason about the correctness of the statement with an example. 3 K4 CO4

15. a) i. Define and differentiate P, NP, and NPC problems. 7 K2
 ii. Provide a complete analysis of Insertion sort for the given set of numbers 89, 45, 68, 90, 29, 34 and 17. Also analyze its time and space complexities. Provide pseudo code for insertion sort. 6 K2 CO5

(OR)

- b) i. Explain subset sum problem with an example. 7 K2
 ii. Show that subset sum problem is NP Complete. Can we have a polynomial time reduction of subset sum problem to set partition problem? 6 K2 CO5

PART – C

(1 x 15 = 15Marks)

Q.No.	Questions	Marks	KL	CO
16. a)	i. Using Dynamic programming, write an algorithm to calculate Fibonacci sequence. Analyze complexity of your algorithm.	8	K4	CO1
	ii. Solve the recurrence $T(n) = T(n/3) + T(2n/3) + n$ by using recursion tree method. Specify the height of the tree.	7	K5	CO3
(OR)				
b)	i. Write an algorithm for checking whether a string of length k is a substring in a string of length m. What will be the worst case complexity of an efficient algorithm for this?	8	K4	CO2
	ii. Write a divide and conquer algorithm for finding the minimum and the maximum of n numbers using at most $3n/2$ comparisons.	7	K5	CO3