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R. V. COLLEGE OF ENGINEERING

Autonomous Institution affiliated to VTU

V Semester B. E. Fast Track Examinations July-16

Computer Science and Engineering

OBJECT ORIENTED ANALYSIS AND DESIGN (ELECTIVE)

Time: 03 Hours

Maximum Marks: 100

Instructions to candidates:

1. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
2. Answer FIVE full questions from Part B.

PART-A

1	1.1	What is a use case?	01
	1.2	What is object-oriented system development methodology?	02
	1.3	Define aggregation.	01
	1.4	What is metadata?	01
	1.5	UML stands for _____.	01
	1.6	Class responsibilities are defined by _____.	01
	1.7	Define association relationship.	01
	1.8	Discuss the use of OCL?	02
	1.9	Represent in UML the class notation for 'car' class.	02
	1.10	What is a class diagram?	01
	1.11	What is encapsulation and information hiding?	02
	1.12	What is an attribute?	01
	1.13	Represent the class visibility feature in UML.	02
	1.14	What is interaction modeling?	01
	1.15	What is RAD?	01

PART-B

2	a	List the characteristics of object-oriented system.	04
	b	Describe the activities of an object-oriented system development life cycle with a neat diagram.	12
		OR	
3	a	Design an application for the pay roll system using the steps of object-oriented approach.	12
	b	Compare aggregation and association relationship in OOAD.	04
4	a	Prepare a use case diagram for a physical book store checkout system.	04
	b	Explain UML interaction diagram with a suitable example.	08
	c	Write a short note on packages.	04
		OR	

5	a	Prepare a class diagram for a graphical document editor that supports grouping. Assume that a document consists of several sheets. Each sheet contains drawing objects, including text, geometrical objects and groups. A group is simply a set of drawing objects, possibly including other groups. A group must contain atleast two drawing objects. A drawing object can be a direct member of at most one group. Geometrical objects include circles, ellipses, rectangles, lines and squares.	08
	b	Explain the various relationships that are possible among the classes in the <i>UML</i> representation with an example for each.	08
6	a	Explain the method of identifying the classes using the Noun phrase approach. Associate each step for an <i>ATM</i> system.	12
	b	Justify that analysis is a difficult activity.	04
OR			
7	a	List the guidelines for developing effective documentation.	04
	b	Draw the use case diagram for transactions such as transaction history, deposit amount, checking account and savings account.	08
	c	Write a short note on super-sub class relationship.	04
8	a	How are attributes refined for the vianet bank objects? Explain.	09
	b	Explain the protocols used for class visibility and represent them in <i>UML</i> .	07
OR			
9	a	Explain, in detail, the axioms and corollaries used in object oriented design.	10
	b	Write a short note on <i>UML</i> object constraint language (<i>OCL</i>).	06
10	a	Define a pattern. Explain the different pattern categories.	06
	b	Explain briefly about the master slave pattern.	10
OR			
11	a	Write a short note on whole part design pattern.	08
	b	Describe the relationship between the patterns.	08

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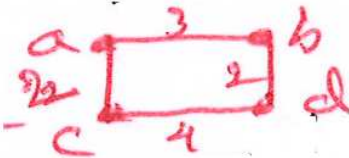
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R. V. COLLEGE OF ENGINEERING
Autonomous Institution affiliated to VTU
V Semester B. E. Fast Track Examinations July-16
Computer Science and Engineering
GRAPH THEORY AND APPLICATIONS (ELECTIVE)

*Time: 03 Hours**Maximum Marks: 100**Instructions to candidates:*

- Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
- Answer FIVE full questions from Part B.

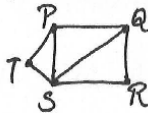
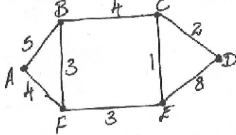
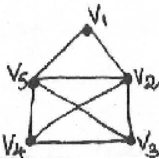
PART-A

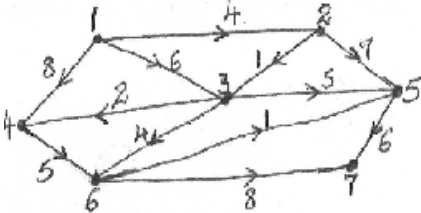
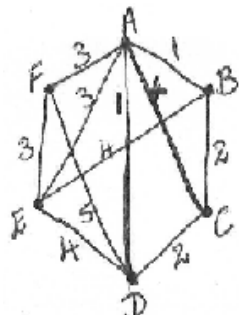
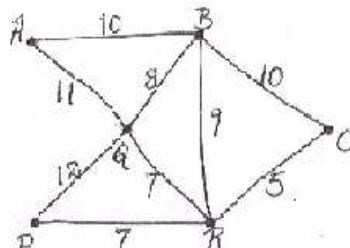
1	1.1	Name two classic problems based on bipartite graphs.	01
	1.2	Find the minimum degree and maximum degree of the graph in fig.1.2	
			
		Fig 1.2	02
	1.3	In a K -regular graph having n vertices and m edges, m is given by the equation _____.	01
	1.4	Show that the number of odd vertices in a graph is even.	02
	1.5	A forest is a graph in which every component is a _____, and a tree has _____ edges.	01
	1.6	What is meant by centers of the tree.	01
	1.7	Find the edge connectivity of the graph in Fig. 1.7.	
			
		Fig1.7	01
	1.8	Describe Warshall algorithm.	02
	1.9	Let G be a 4-regular connected planar graph having 16 edges. Find the number of regions of G .	02
	1.10	State Menger's theorem.	01
	1.11	What is meant by stable matching?	01
	1.12	If G and H are two simple 1-isomorphic graphs, then find $X(G)$.	01
	1.13	If K colors are available to vertex color a complete graph K_n with n vertices, then find $X(k_n)$.	01
	1.14	Find the chromatic polynomial for a tree T with ' n ' vertices.	01

1.15	Find the maximum flow possible between the vertices P and S in the graph shown in Fig 1.15	
<p style="text-align: center;">Fig 1.15</p>		02

PART-B

2	<p>a Define degree, open and closed neighborhood. For the given graph, find the degrees of all vertices. Determine open and closed neighborhood of u_1 and u_4 in the graph.</p> <p style="text-align: center;"> </p> <p style="text-align: center;">Fig. 2a</p> <p>b State and prove “Hand-Shaking theorem”.</p> <p>c Define Walk. Prove that if a graph G having distinct vertices u and v contains a u, v -walk, then G contains a $u - v$ path.</p> <p style="text-align: center;">OR</p>	06 04 06
3	<p>a Prove that a simple graph G with n vertices and k components has $E(G) \leq \frac{(n-k)(n-k+1)}{2}$.</p> <p>b Define isomorphism. Determine whether the given graphs are isomorphic or not.</p> <p style="text-align: center;"> </p> <p style="text-align: center;">Fig 3b</p> <p>c For the digraph shown, determine the in degrees and out degrees of all vertices. Give examples for path graph and cycle graph.</p> <p style="text-align: center;"> </p> <p style="text-align: center;">Fig. 3c</p>	05 05 06

4	a	Define a tree. Prove that every tree with atleast two vertices has atleast two leaves.	06
	b	Show that, in a tree, if the degree of every non-pendent vertex is 3, the number of vertices in the tree is even.	04
	c	Describe the algorithmic problem of finding a minimum cost Hamiltonian cycle in a weighted graph G (traveling salesman problem).	06
OR			
5	a	Determine the Euler trial for the given graph.  <p style="text-align: center;">Fig 5 (a)</p>	03
	b	Show that a connected graph with exactly two vertices of odd degree has an Euler trail.	03
	c	How many edge-disjoint Hamilton cycles exist in the complete graph with 7 vertices?	04
	d	State and prove Kruskal's algorithm to compute minimal cost spanning tree T .	06
6	a	Define dual of a planar graph. Show that Kuratowski's first graph, K_5 is non planar.	06
	b	What are homeomorphic graphs? Explain with an example.	05
	c	Describe and prove Hall's matching condition.	05
OR			
7	a	What is edge connectivity? Prove min-max theorem. For the given network, determine the maximum flow between A and D by identifying the cut-set of minimum capacity.  <p style="text-align: center;">Fig. 7a</p>	10
	b	Show that K_5 and $K_{3,3}$ are non planar using Euler's formula.	06
8	a	What is a multipartite graph? Define proper vertex coloring and chromatic number of G with suitable examples.	05
	b	Find the chromatic polynomial for the given graph. If 5 colors are available, in how many ways can the vertices of this graph be properly colored?  <p style="text-align: center;">Fig. 8b</p>	
	c	State and prove Tait's theorem.	06
OR			

9	a	<p>What is a chord of a cycle? Define chordal graph with example. Show that for the cycle C_n on 'n' vertices, we have:</p> $\chi C_n(t) = (t-1)[(t-1)^{n-1} + (-1)^n].$ <p>b Find the chromatic number of Petersen graph.</p> <p>c State five-color theorem. Explain and prove with an example.</p>	08 03 05
10	a	<p>Use Dijkstra's algorithm to obtain the shortest path from vertex 1 to each of the other vertices in the weighted, directed graph shown below. Indicate the weights of these paths.</p>  <p style="text-align: center;">Fig. 10a</p>	10
	b	<p>Using Prim's Algorithm, find a minimal spanning tree for the weighted graph shown below.</p>  <p style="text-align: center;">Fig. 10b</p> <p style="text-align: center;">OR</p>	06
11	a	<p>What is minimal spanning tree? Explain with an example. Use Kruskal's algorithm and find a minimal spanning tree for the weighted graph shown below.</p>  <p style="text-align: center;">Fig. 11a</p>	08
	b	<p>State and prove Bellman-Ford algorithm.</p>	08

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R. V. COLLEGE OF ENGINEERING
Autonomous Institution affiliated to VTU
V / VI Semester B. E. Fast Track Examinations July-16
Computer Science and Engineering
JAVA AND JEE (ELECTIVE)

Time: 03 Hours**Maximum Marks: 100****Instructions to candidates:**

3. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
4. Answer FIVE full questions from Part B.

PART-A

1	1.1	Write the use of super keyword in Java.	01
	1.2	Find errors, if any or write the output of the following program: <pre>class example { public static void main(String[] args) { int a1,b1; try { a1 = 0; b1 = 38/a1; } catch(Exception e1) { System.out.println("Error"); } catch(ArithmeticException e2) { System.out.println("ArithmeticError"); } } }</pre>	
	1.3	Write the output for the following statements: i) <code>System.out.println(9 >> 2);</code> ii) <code>System.out.println(0453);</code>	02
	1.4	State whether the following statements are valid or not: i) Immediate superclass of Exception class is not an object. ii) The order in which one writes the multiple catch statements does not play any significant role as far as exception handling is concerned. iii) Finally block does not get executed if one returns from the catch block. iv) The sleep method should be included in try block.	02

1.5	<p>What is the output of the following program?:</p> <pre> class demo { static void A() { try { System.out.println("A"); } finally { System.out.println("Final A"); } } } public static void main(string[] args) { try { A(); } catch(Exception e) { System.out.println("Exception"); } finally { System.out.println("Main"); } } </pre>	02
1.6	List out the methods that can be called only from within a synchronized context.	01
1.7	How is the <i>JDBC</i> driver loaded and registered?	01
1.8	<p>Find the output of the following program:</p> <pre> class A { static void display() { System.out.println("\nA"); } } class B extends A { void display() { System.out.println("\nB"); } } public class test { public static void main(String[] args) { A a1 = new A(); a1.display(); } } </pre>	01

1.9	What is the output of the following code?: <pre> class thread1 extends Thread { String name; Thread t; thread1(String tname) { name = tname; t = new Thread(this,name); System.out.println(t); } } class A { public static void main(String args[]) { new thread1("First"); new thread1("second"); new thread1("Third"); } } </pre>	02
1.10	List out the two exception classes defined in javax.servlet.package.	01
1.11	What are the three different constants that are used in scrollable ResultSet?	02
1.12	_____ package provides interfaces and classes for handling http requests and http responses.	01
1.13	What are native methods in Java?	01
1.14	Differentiate between set and list interfaces of collections.	01

PART-B

2	a	What is dynamic method dispatch? Illustrate with an example.	05
	b	List and explain any eight features of Java.	06
	c	With an example program, explain the concept of abstract class.	05
		OR	
3	a	Discuss the different steps involved in creating user defined package.	06
	b	Differentiate between multiple inheritance and multilevel inheritance in Java.	06
	c	Explain the concept of static methods and static variables with an example program.	04
4	a	What is an exception in Java? Write a program to illustrate the usage of throw and throws keywords.	06
	b	What are the uses of the following methods in threads? Also indicate whether they throw any exceptions. i) suspend and resume; ii) isAlive and join; iii) setName and getName; iv) start and run; v) sleep and stop.	10

		OR	
5	a	What are thread priorities? Write a program to create a thread by implementing an appropriate interface and set the priority.	08
	b	Create a custom exception class called StudentFailedException. Write a program to throw this exception and handle it appropriately.	08
6	a	What is the difference between boxing and unboxing?	03
	b	With a programming example, explain the following collection classes: i) Array list; ii) Linked List.	05
	c	Explain the following steps in <i>JDBC</i> process with an example: i) Creating and Executing a <i>SQL</i> statement; ii) Process data returned by <i>DBMS</i> .	08
		OR	
7	a	How is a collection accessed via an iterator? Also list out the methods of List iterator.	06
	b	Write short notes on: i) <i>DBMS</i> transaction processing; ii) Prepared statement object.	10
8	a	Write a program to illustrate the concept of reading servlet parameters.	08
	b	Explain the methods for the following collection interfaces. i) Queue ii) Dequeue.	08
		OR	
9	a	Differentiate between <i>CGI</i> and Servlets.	02
	b	What is a cookie? Why are they used? Write a servlet program to read and write cookies.	10
	c	Explain the following methods of http servlet and write their signature. i) doGet; ii) doPost; iii) doPut; iv) doDelete.	04
10	a	Write a <i>JSP</i> program to load html tables using the different looping statements.	06
	b	Explain, with <i>JSP</i> code, how create and read session attributes can be created.	05
	c	Give an example for each of the five tags in <i>JSP</i> .	05
		OR	
11	a	Explain the concept of calling a Java method from a <i>C</i> function.	07
	b	List out the Java array types and their corresponding <i>C</i> types.	03
	c	Discus in detail about how to access array elements.	06

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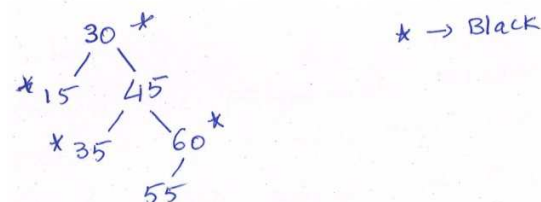
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R. V. COLLEGE OF ENGINEERING
Autonomous Institution affiliated to VTU
V Semester B. E. Fast Track Examinations July-16
Computer Science and Engineering
ADVANCED ALGORITHMS (ELECTIVE)

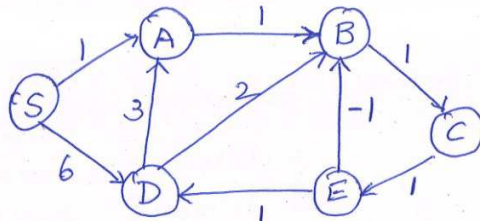
Time: 03 Hours**Maximum Marks: 100****Instructions to candidates:**

5. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
6. Answer FIVE full questions from Part B.

PART-A

1	1.1	Solve the following equation using Master's theorem: $T(n) = T(9n/10) + n$.	01
	1.2	Give a recurrence relation for the running time $T(n)$ of the following pseudocode: define $dqContains([a_1 \dots a_n], k)$ if $n == 1$ return $a_1 = k$ return $dqContains([a_1 \dots a_{\frac{n}{2}}], k) \parallel dqContains([a_{\frac{n}{2}+1} \dots a_n], k)$	01
	1.3	Draw the partial match table for the pattern "abababca".	02
	1.4	Write the code for relaxation of $edge(u, v)$.	02
	1.5	Show the result of inserting 50 into the Red-Black tree depicted below: 	02
		Fig. 1.5	02
	1.6	What is the running time of Ford Fulkerson algorithm?	01
	1.7	A bag has certain amount of balls. If you take out 4 balls at a time 2 balls are left, if you take out 5 balls at a time 3 are left. What is the smallest number of balls in the bag?	02
	1.8	Utilize Euclid's algorithm to compute $gcd(803, 154)$.	01
	1.9	Illustrate the butterfly operation with a figure.	02
	1.10	Mention the running time of Recursive FFT.	01
	1.11	Illustrate why insert is costly in skip lists.	01
	1.12	Convert the polynomial $A(x) = x^3 + 2x^2 + x + 2$ to point value representation form.	02
	1.13	Consider RSA key set with $p = 11, q = 41, n = 451$ and $e = 3$. What value of d should be used in secret key? What is the encryption of message $m = 100$?	02

PART-B

2	a	Apply recursion tree method to determine a good asymptotic upper bound on the recurrence: $T(n) = 2T(n/2) + n^2$	08																																																
	b	Define and explain the basic asymptotic notations O, Ω, θ . Let $f(n) = \frac{7}{2}n - 78$ and $g(n) = \frac{1}{2}n^2$. Prove that $f(n) = O(g(n))$ for some value of c .	08																																																
OR																																																			
3	a	Solve the recurrence $T(n) = 2T(n/2) + n$ using substitution method. Guess the solution using recurrence tree.	10																																																
	b	Explain accounting method for stack operations.	06																																																
4	a	Write Rabin-Karp algorithm and discuss its complexity. With $q = 11$, how many spurious hits does Rabin-Karp encounter when looking for $p = 26$ in $T = 3141592653589793$.	10																																																
	b	Apply Bellman-Ford on the given graph with source vertex S with all the iterations.	06																																																
																																																			
Fig. 4b																																																			
OR																																																			
5	a	Write the steps in Johnson algorithm and mention its complexity. Illustrate the importance of Bellman-Ford and Dijkstra's algorithm in Johnson algorithm.	10																																																
	b	Construct finite automata table and figure for the pattern $ACACAGA$.	06																																																
6	a	Six reporters Asif(A), Becky(B), Chris(C), David(D), Emma(E) and Fred(F) are to be assigned to six news stories Business(1), Crime(2), Financial(3), Foreign(4), Local(5) and Sport(6). The table below shows possible allocation of reporters to news stories.	10																																																
	b	<table border="1" data-bbox="663 1588 1035 1854"><tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td>A</td><td></td><td></td><td></td><td></td><td>✓</td><td></td></tr><tr><td>B</td><td>✓</td><td></td><td></td><td>✓</td><td></td><td></td></tr><tr><td>C</td><td>✓</td><td>✓</td><td></td><td>✓</td><td></td><td></td></tr><tr><td>D</td><td></td><td></td><td></td><td></td><td>✓</td><td></td></tr><tr><td>E</td><td></td><td></td><td>✓</td><td></td><td>✓</td><td>✓</td></tr><tr><td>F</td><td></td><td></td><td></td><td>✓</td><td></td><td></td></tr></table> <p>i) Show these allocations on a Bipartite graph; ii) Use appropriate algorithm to find maximal matching.</p>		1	2	3	4	5	6	A					✓		B	✓			✓			C	✓	✓		✓			D					✓		E			✓		✓	✓	F				✓		
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7	a	<p>Consider the Fibonacci heap below. Nodes that are double circled are marked nodes.</p> <p>i) What is the potential of the heap?;</p> <p>ii) Suppose delete-min is performed, show the resulting heap after consolidation.</p>	
		Fig. 7a	10
	b	<p>Define the following:</p> <p>i) Max-flow min-cut theorem;</p> <p>ii) Probabilistic skip list;</p> <p>iii) Flow Conservation.</p>	06
8	a	Explain Euclid and extended-Euclid algorithms and mention their complexity.	08
	b	<p>With steps, show the modular exponentiation of $58^{360} \bmod 11$.</p> <p style="text-align: center;">OR</p>	08
9	a	Explain Miller-Rabin algorithm and mention its complexity. Show 137 is composite or prime using Miller-Rabin method where $s = 1$ and $a = 93$.	10
	b	Explain Pollard-Rho factorization method with example.	06
10	a	Explain recursive-FFT algorithm and mention its complexity.	10
	b	<p>Analyze, with an example, how point-wise multiplication of polynomials is better than ordinary multiplication of polynomials.</p> <p style="text-align: center;">OR</p>	06
11	a	Discuss iterative FFT with algorithm and its complexity.	10
	b	State and prove halving lemma of FFT.	06

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R. V. COLLEGE OF ENGINEERING
Autonomous Institution affiliated to VTU
V Semester B. E. Fast Track Examinations July-16
Computer Science and Engineering
MULTIMEDIA COMPUTING (ELECTIVE)

Time: 03 Hours**Maximum Marks: 100****Instructions to candidates:**

7. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
8. Answer FIVE full questions from Part B.

PART-A

1	1.1	Differentiate between image and graphics formats.	02																
	1.2	List any one lossless compression algorithm and lossy compression algorithm.	02																
	1.3	Write the applications of uniform quantization and non-uniform quantization.	02																
	1.4	List any two advantages of wavelet-based coding over other compression techniques.	02																
	1.5	A fax machine has a resolution of 800 bi-tonal dots per inch. How many seconds will be needed to transmit the contents (in uncompressed form) of an A4 size (8.5" × 11") paper using a 54.6 kbps line?	02																
	1.6	Why is CD quality audio sampled at a 44.1 KHz frequency when the human hearing frequency range is only between 20 Hz and 20 KHz?	02																
	1.7	State the purpose of Zig-Zag scan in JPEG. What is the result of the zig-zag step being applied to the following quantized block?: <div><table><tr><td>4</td><td>1</td><td>2</td><td>5</td></tr><tr><td>1</td><td>0</td><td>0</td><td>1</td></tr><tr><td>4</td><td>2</td><td>1</td><td>4</td></tr><tr><td>0</td><td>0</td><td>1</td><td>1</td></tr></table></div>	4	1	2	5	1	0	0	1	4	2	1	4	0	0	1	1	02
	4	1	2	5															
	1	0	0	1															
	4	2	1	4															
	0	0	1	1															
	1.8	List any two characteristics of Multimedia Data.	01																
	1.9	Mention the IP-based protocols used for MPEG – 4 over IP application to be facilitated.	01																
1.10	List any two applications of Media-on-Demand (MoD).	01																	
1.11	If the DC coefficients for the first five image blocks are 150,155,149,152,144, find the DPCM values.	01																	
1.12	What is the advantage of interlaced video? What are some of its problems?	01																	
1.13	During which phase of MPEG compression is JPEG compression technique used.	01																	

PART-B

2	a	Write four points for each of <i>GIF</i> , <i>TIFF</i> , <i>JPEG</i> and <i>PNG</i> .	08
	b	“Different types of media will require different types of operations to provide adequate levels of functionality in a multimedia application”. Comment and justify.	08
OR			
3	a	Identify three novel applications of the Internet or multimedia applications. Discuss why you think these are novel.	08
	b	What issues of functionality need to be provided in order to effectively use wide variety of media in Multimedia applications? Your answer should briefly address how such functionality can facilitate in general Multimedia applications?	08
4	a	Consider the following set of color-related terms: i) wavelength ii) color level iii) brightness iv) whiteness. How would you match each of the following (more vaguely stated) characteristics to each of the above terms with proper justification. i) luminance ii) hue iii) saturation iv) chrominance.	08
	b	What happens if we artificially increase the output gamma for stored image pixels? What is the effect on the image?	02
	c	What are the most salient differences between ordinary <i>TV</i> and <i>HDTV</i> ? We don't see flicker on a workstation screen when displaying video at <i>NTSC</i> frame rate. Why do you think this might be?	06
	OR		
5	a	Digital video uses chroma subsampling. What is the purpose of this? Why is it feasible?	08
	b	In general, what are the two main kinds of <i>MIDI</i> messages? In terms of data, what is the main difference between the two types of messages? Within those two categories, list the different subtypes.	08
6	a	Suppose the alphabet is $[A; B; C]$, and the known probability distribution is $P_A = 0.5$; $P_B = 0.4$; $P_C = 0.1$. For simplicity, let us also assume that both encoder and decoder know that the length of the messages is always 3, so there is no need for a terminator. i) How many bits are needed to encode the message <i>BBB</i> by Huffman coding?; ii) How many bits are needed to encode the message <i>BBB</i> by arithmetic coding?	10
	b	List the applications of Run Length encoding. Apply Run Length Encoding for the data given below: 111122233333311112222. Calculate the compression ratio for the above data.	06
OR			

7	a	Given the following Differential Pulse Code Modulated (<i>DPCM</i>) sequence reconstruct the original signal: +3 + 3 + 4 - 2 + 5 - 1 + 2 + 1	02															
	b	Consider the set of characters given below. Encode the characters using Huffman encoding: <i>BBBAAAACCCADDABBBBABEEEEEDDABB</i>	06															
	c	Discuss, with an example, the working of Dictionary-based compression algorithm.	08															
8	a	Explain video compression technique with respect to <i>MPEG – 4</i> .	08															
	b	<p>Given the following portion from an 8×8 block from an image after the Discrete Cosine Transform has been applied:</p> <table border="1" data-bbox="707 602 995 757"> <tr><td>128</td><td>64</td><td>46</td><td>128</td></tr> <tr><td>128</td><td>32</td><td>64</td><td>160</td></tr> <tr><td>32</td><td>16</td><td>12</td><td>32</td></tr> <tr><td>4</td><td>31</td><td>40</td><td>32</td></tr> </table> <p>i) What is the result of the quantization step of the <i>JPEG/MPEG</i> compression method assuming that constant quantization value of 32 was used?;</p> <p>ii) What is the result of the following zig-zag step being applied to the quantized block?;</p> <p>iii) What is the result of the following run length encoding (<i>RLE</i>) step being applied to the zig-zag step's output?</p> <p style="text-align: center;">OR</p>	128	64	46	128	128	32	64	160	32	16	12	32	4	31	40	32
128	64	46	128															
128	32	64	160															
32	16	12	32															
4	31	40	32															
9	a	Illustrate the <i>JPEG</i> image compression technique, with a neat block diagram.	10															
	b	Is the <i>JPEG2000</i> bitstream SNR scalable? If so, explain how it is achieved using the <i>EBCOT</i> algorithm.	06															
10	a	Several protocols, such as Ethernet, Token ring and <i>FDDI</i> are commonly used in <i>LAN</i> . Discuss the functionalities of these three technologies and differences among them.	10															
	b	Discuss at least two alternative methods for enabling QoS routing on packet-switched networks based on a QoS class specified for any multimedia packet.	06															
11	a	Justify as to how increased bandwidth and faster transmission are among the attributes that make asynchronous transfer mode (<i>ATM</i>) the emerging technology of choice for LAN backbones, WANs, and campus area networks for collaborative multimedia and data-rich applications.	08															
	b	Differentiate between the <i>OSI</i> and <i>TCP/IP</i> Reference Models.	08															

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R. V. COLLEGE OF ENGINEERING
Autonomous Institution affiliated to VTU
V Semester B. E. Fast Track Examinations July-16
Computer Science and Engineering
COMPUTER NETWORKS – I

*Time: 03 Hours**Maximum Marks: 100**Instructions to candidates:*

9. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
10. Answer FIVE full questions from Part B.

PART-A

1	1.1	Write two merits and two demerits of the network topology most commonly used in today's Ethernet technology.	02
	1.2	The <i>HDTV</i> screen, with an aspect ratio of 16:9, has 1920 pixels horizontally. The screen is refreshed 120 times per second and each color pixel is represented by 24 bits. Calculate the bit rate required.	02
	1.3	What is the purpose of the mid-bit transition of signals introduced in Manchester and differential Manchester schemes?	01
	1.4	What do the letters <i>V</i> and <i>B</i> denote in the sequence of voltages used by the scrambling techniques?	01
	1.5	How is receiver synchronization achieved in Asynchronous transmission?	01
	1.6	In a synchronous <i>TDM</i> scheme with 8 inputs, the input bit duration is 1 microsecond. What is the output bit rate?	01
	1.7	Why does a system require a logical address to communicate over an internetwork?	01
	1.8	Differentiate between burst length and burst error.	01
	1.9	What is the difference between augmented dataword and codeword in <i>CRC</i> ?	01
	1.10	The initial value of the checksum is set to _____ at the sender site.	01
	1.11	Why does a sender using Stop-and-Wait <i>ARQ</i> protocol store a frame and under what condition does it purge that frame?	01
	1.12	Using 5-bit sequence numbers, what is the maximum size of the send and receive windows for: i) Go-Back-N <i>ARQ</i> and ii) Selective-Repeat <i>ARQ</i> ?	02
	1.13	Why do two nodes using PPP establish a network layer agreement in the network phase?	01
	1.14	In the polling method of controlled access, what does a primary station do if it receives a <i>NAK</i> frame as a response from a secondary station?	01
	1.15	Write any two functions of token management in a token passing scheme.	01
	1.16	How is data represented in a <i>CDMA</i> scheme?	02

PART-B

2	a	Describe the four fundamental characteristics which determine the effectiveness of a data communications system.	06
	b	Draw a schematic diagram showing a heterogeneous network comprising at least two types each of <i>LANs</i> and <i>WANs</i> . Explain the same with examples.	10
OR			
3	a	Draw the time-domain and frequency-domain representations of a composite periodic signal. Explain with an example.	04
	b	What is meant by Latency of a communication link? Explain the different components of latency.	06
	c	State Shannon's formula for determining the capacity of a channel. A communication channel has a bandwidth of 2 MHz and an SNR of 36 dB. Compute the capacity of this channel.	06
4	a	Explain the Manchester and differential Manchester schemes of line coding with an example (clearly state the assumptions made).	06
	b	Describe the steps involved in block coding. Draw a schematic diagram indicating how the encoded data is communicated over a link.	04
	c	What is Scrambling and why is it used? Draw the Bipolar AMI and B8ZS diagrams for the bit patterns 1100000000110000010.	06
OR			
5	a	Explain the salient differences between <i>FDM</i> , <i>WDM</i> and <i>TDM</i> .	06
	b	Five channels with bit rates of 100 Kbps, 50 Kbps, 92 Kbps, 46 Kbps, 200 Kbps are to be multiplexed. Design a suitable synchronous <i>TDM</i> system and explain your design.	05
	c	Explain, briefly, the basic principle of operation of Fiber-optic cable and highlight the advantages and disadvantages of optical fiber.	05
6	a	What is the main difference between network layer and transport layer in respect of reliability of packet/message delivery? What are the various protocols used at the network and transport layers? Explain, briefly, their functions.	10
	b	What are service primitives? Explain briefly the service primitives used for implementing a simple connection-oriented service.	06
OR			
7	a	Draw the schematic diagram of a <i>CRC</i> encoder and decoder and explain their operation.	06
	b	Write a short note on polynomial representation of cyclic codes.	04
	c	Compute the internet checksum of the following group of words: 4500, 001C, 0001, 0000, 0411, 0000, 0A0C, 0E05, 0C06, 0709. Illustrate the verification of the computed value.	06

8	a	Explain, briefly, the following terms as relevant to data link control: i) Framing; ii) Flag; iii) Byte stuffing; iv) Bit stuffing; v) Flow control; vi) Error control.	06
	b	Discuss the taxonomy of protocols in the data link layer and highlight their merits and demerits.	06
	c	Write short note on piggybacking.	04
OR			
9	a	Why are sequence numbers assigned to frames and acknowledgements in data link protocols? Discuss. Explain the design of the Stop-and-Wait <i>ARQ</i> protocol with a schematic diagram.	10
	b	What is <i>PPP</i> and where is it used? Discuss the services provided by <i>PPP</i> .	06
10	a	Illustrate the differences between Random access protocols and Controlled access protocols.	04
	b	Explain, in detail, the <i>CSMA/CA</i> protocol with relevant time-line and flow diagrams.	08
	c	Write a short note on the polling method of controlled access.	04
OR			
11	a	Draw the <i>IEEE 802.3</i> frame format and explain.	06
	b	How does a station detect collision? Discuss the reasons for unsuitability of the <i>CSMA/CD</i> protocol for wireless <i>LANs</i> .	04
	c	Explain the hidden station and exposed station problems encountered in Wireless <i>LANs</i> .	06

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R. V. COLLEGE OF ENGINEERING
Autonomous Institution affiliated to VTU
V Semester B. E. Fast Track Examinations July-16
Computer Science and Engineering
MICROPROCESSOR AND MICROCONTROLLER

*Time: 03 Hours**Maximum Marks: 100**Instructions to candidates:*

11. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
12. Answer FIVE full questions from Part B.

PART-A

1	1.1	For 8086 microprocessor, indicate the size of Address and Data bus.	01
	1.2	Mention the function of index register.	01
	1.3	What is the mode of 8086 if mN/mX is low?	01
	1.4	Write an example for non-maskable interrupt in 8086.	01
	1.5	Mention the use and operation of stack and stack pointer.	02
	1.6	What is the difference between <i>NOT</i> and <i>NEG</i> instructions in 8086 microprocessor?	02
	1.7	What is instruction queue?	01
	1.8	Write the control word format of 8255 in <i>BSR</i> mode to set <i>PC0</i> and reset <i>PC4</i> .	02
	1.9	What are maskable and non-maskable interrupts?	02
	1.10	What is the effect of executing the following program in 8051 microcontroller?: <i>PO = 0X65 0X71;</i> <i>PO = PO >> 2;</i> (indicate the value of <i>PO</i>)	02
	1.11	In 8051, how many pins are designated to <i>I/O</i> port pins?	01
	1.12	Indicate use of ' <i>SCON</i> ' register in 8051.	01
	1.13	What is the status of port pins in 8051 microcontroller on <i>RESET</i> ?	01
	1.14	What is the 8051 interrupt priority when power is <i>ON</i> ?	02

PART-B

2	a	Explain, with a neat diagram, the internal architecture of 8086 microprocessor.	10
	b	Explain the following signals of 8086: i) <i>RQ/GT</i> ; ii) <i>DEN</i> ; iii) <i>LOCK</i> ; iv) <i>DT/R</i> .	06
OR			

3	a	Draw 8086 maximum mode system configuration, indicating the use of the pins/signals.	10
	b	Explain, in detail, the various bits of a flag register in 8086.	06
4	a	Describe the operation of the following instructions with example: i) <i>LEA</i> ; ii) <i>XLAT</i> ; iii) <i>DAA</i> ; iv) <i>IMUL</i> ; v) <i>LOOP</i> .	10
	b	Write an assembly language program to reverse a string and check if the same is a palindrome. OR	06
5	a	What are addressing modes? Mention all the modes with one example each for 8086 microprocessor.	10
	b	Write an 8086 assembly language program to add 10 non-negative data items.	06
6	a	Write the control word of 8255 and explain (both <i>I/O</i> and bit set reset mode).	10
	b	Explain, with a neat diagram, the interfacing of 8 switches and 8 <i>LEDs</i> to 8086 using 8255. OR	06
7	a	Show the schematic diagram to connect seven segment displays to 8255 with 8086.	08
	b	Write the structure of interrupt vector table of 8086, explaining the computation of interrupt vector.	08
8	a	With a neat diagram, explain the memory system of 8051 microcontroller (include details of internal memory and external memory).	10
	b	Write a program to realize a delay 10 <i>ms</i> . Assume the crystal connected to 8051 microcontroller is 12 <i>MHz</i> . OR	06
9	a	Describe the 8051 ports and their uses.	10
	b	Write an 8051 program to generate 10 <i>KHz</i> square wave using timer, when <i>XTAL</i> = 20 <i>MHz</i> .	06
10	a	Write a program in 8051 to rotate a stepper motor 60 steps in the clockwise direction.	10
	b	Why are optoisolators used? Give one application where it is used, with details. OR	06
11	a	Interface 8-bit <i>DAC IC</i> to <i>P2</i> of 8051 microcontroller. Write a program to generate a sine waveform.	08
	b	Explain, with the interfacing details, the program to control the <i>AC/DC</i> high power devices using 8051 microcontroller.	08

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R. V. COLLEGE OF ENGINEERING
Autonomous Institution affiliated to VTU
V/ VI Semester B. E. Fast Track Examinations July-16
Computer Science and Engineering
DATABASE MANAGEMENT SYSTEMS

*Time: 03 Hours**Maximum Marks: 100**Instructions to candidates:*

13. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
14. Answer FIVE full questions from Part B.

PART-A

1	1.1	When relational schema has more than one key, then each of these keys is called _____.	01
	1.2	The total number of attributes 'n' of a relational schema R is called as _____ of a relation.	01
	1.3	Basic 2PL protocol ensures _____ type of schedule.	01
	1.4	Once the transaction begins in rigorous 2PL protocol, it is in _____ phase.	01
	1.5	Find the minimal cover for the following functional dependencies: $AB \rightarrow D, B \rightarrow C, AE \rightarrow B, A \rightarrow D, D \rightarrow EF$	02
	1.6	Write the differences between composite and complex attributes.	02
	1.7	What is the difference between the working of the following statements: <i>COUNT (*)</i> , <i>COUNT (COLUMN_NAME)</i>	02
	1.8	How are aggregate functions and group by clause represented in relational algebra?	02
	1.9	_____ is called intension and _____ is called extension.	02
	1.10	How can the given schedule S_c be made cascadeless-schedule? $S_c = w1(A), w2(A), w1(B), r2(B), c1, c2$	02
	1.11	Derive division operation using complete set of relational algebra operation.	02
	1.12	Compare <i>DISTINCT</i> & <i>ALL</i> keywords when used with <i>SELECT</i> command.	02

PART-B

2	a	<p>Draw the Entity Relationship Diagram (ERD) for the following scenario.</p> <p>A salesperson may manage many other salespeople. A salesperson is managed by only one salespeople. A salesperson can be agent for many customers. A customer is managed by one salesperson. A customer can place many orders. An order can be placed by one customer. An order lists many inventory items. An inventory item may be listed on many orders. An inventory item is assembled from many parts. A part may be assembled into many inventory items. Many employees assemble an inventory item from many parts. A supplier supplies many parts. A part may be supplied by many suppliers.</p>	10
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	b	Give the difference between logical data independence and physical data independence. Which one is harder to achieve? Why?	06
		OR	
3	a	Write the symbol and explain different types of attributes in a relational database.	08
	b	What are the different characteristics of <i>DBMS</i> ? Explain.	08
4	a	Consider the following relations: <i>Student (ssn, name, address, major)</i> <i>Course (code, title)</i> <i>Registered (ssn, code)</i> . Write the following queries in relational algebra: i) List the codes of courses for which no student is registered. ii) Names of students and the titles of course they registered to. iii) SSNs of students who are registered for 'Database Systems' or 'Advanced algorithms'. iv) The titles of courses for which no student is registered.	10
	b	When is Having clause used in <i>SQL</i> query? Explain, with an example.	06
		OR	
5	a	Consider the following employee database and write the <i>SQL</i> queries for the same. <i>Employee (employee – name, street, city)</i> <i>Works (employee – name, company – name, salary)</i> <i>Company (company – name, city)</i> <i>Manager (employee – name, manager – name)</i> i) Find all employees in the database who live in the same cities as the companies for which they work; ii) Find all employees in the database who do not work for First Bank corporation; iii) Find all employees in the database who earn more than every employee of Small Bank corporation. iv) Find the company that has the most employees.	10
	b	What is the join in relational algebra? List and explain variations of joins with suitable examples.	06
6	a	Define multi-valued dependencies and fourth normal form with proper example.	06
	b	Explain different properties of relational decomposition.	05
	c	Consider the universal relational $R = \{A, B, C, D, E, F, G, H, I, J\}$ and the set of functional dependencies $G = \{A, B\} \rightarrow C, \{B, D\} \rightarrow \{E, F\}, \{AD\} \rightarrow \{GH\}, \{A\} \rightarrow \{I\}, \{H\} \rightarrow \{J\}$. What is the key for R ? Decompose R into <i>2NF</i> , <i>3NF</i> relations.	05
		OR	
7	a	List and discuss the different approaches to database programming.	06
	b	When does problem of spurious tuples exist and how can one prevent it?	04

c		Suppose the schema $R = \{A, B, C, D, E, F, G, H\}$ is decomposed into $R_1 = (A, B, C, H)$, $R_2 = (A, D, E, F)$, $R_3 = (F, G, H)$ with the following set of <i>FD's</i> : $A \rightarrow B, CD \rightarrow EF, B \rightarrow CD, E \rightarrow A, F \rightarrow G, AB \rightarrow H$. Test that the above decomposition has lossless join property.	06
8	a	Why is concurrency control needed? Explain the role of system log in transaction processing.	10
	b	Explain two-phase locking protocol. How is it different from strict 2PL protocol?	06
		OR	
9	a	What is <i>ACID</i> property? With an example, illustrate the following terms: serial, nonserial, serializable schedules.	08
	b	When does Deadlock occur during transaction processing? Explain Deadlock prevention protocols.	08
10	a	What is write ahead logging? Explain the terms steal/no-steal, force/no-force when a page from database is written to disk from cache.	08
	b	Which are the control measures used to provide security of data in database? Explain.	08
		OR	
11	a	What are the different types of Discretionary privileges? Explain, with example, the propagation of privileges using <i>GRANT</i> option.	08
	b	What is mandatory access control? Explain the typical security classes in Mandatory access control.	08