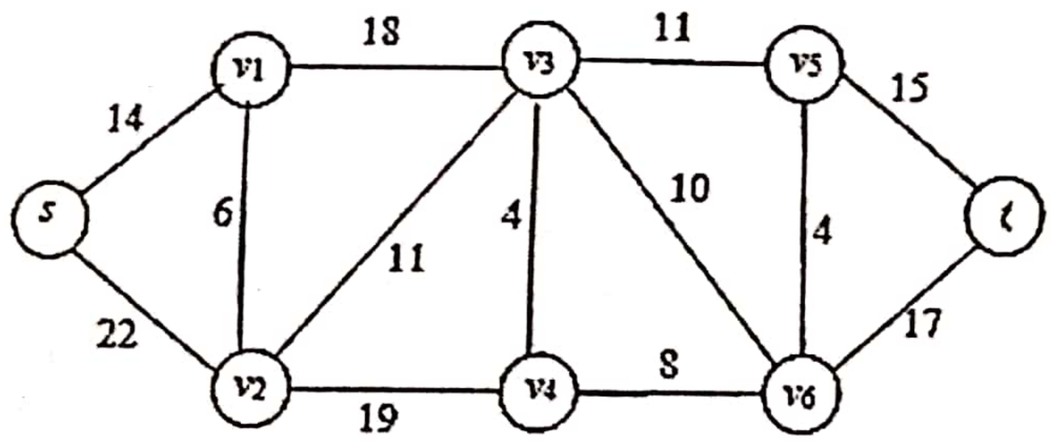
POKHARA UNIVERSITY

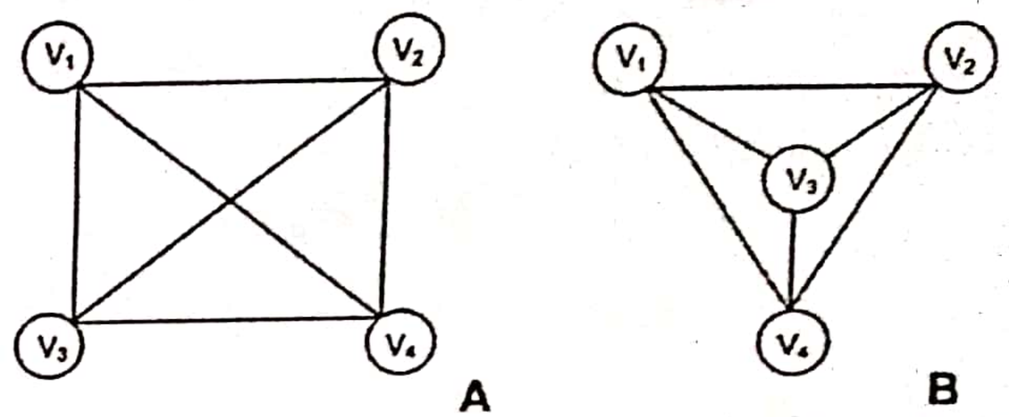
Level: Bachelor Semester: Fall Year : 2019
Programme: BCA Full Marks: 100
Course: Mathematical Foundation of Computer Science Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

1. a) What is the degree sequence of K_n, where n is a positive integer? How many subgraphs with at least one vertex does K_2 have? Draw the structure of following graphs. 8
   K_6 , $K_{3,4}$, W_6 , C_6 , Q_3
   b) What is strongly connected graph? A connected planar graph has 20 vertices, each of degree 3. How many edges and faces are there? 7
2. a) Use Dijkstra's algorithm to find the length of a shortest path between the vertices s and t in the weighted graph displayed in figure: 8



   b) Define the terms in graph theory: Hamiltonian circuit, Euler circuit and Isomorphism with suitable examples. 7
3. a) Identify and prove your answer that following two graphs A and B are isomorphic or not. 5



   b) Prove that $(p \rightarrow r) \vee (q \rightarrow r) \Leftrightarrow (p \wedge q) \rightarrow r$ and $(p \vee q) \wedge (\neg p \wedge \neg q)$ is contradiction. 5
   c) Show that the hypothesis "If I take the day off, it either rains or snows", "I took Tuesday off or I took Thursday off." "It was sunny on Tuesday". Lead to the conclusion "It did not snow on Thursday". 5
4. a) Define proposal logic. Prove that the following relations are logically equivalent using truth table: 8
      i. $(p \rightarrow q) \wedge (p \rightarrow \neg q) \Leftrightarrow \neg p$
      ii. $(p \leftrightarrow q) \Leftrightarrow (p \rightarrow q) \wedge (q \rightarrow p)$
   b) Translate each of these statements into logical expression using predicates, quantifiers and logical connectives. 7
      i. No one is perfect
      ii. Not everyone is perfect
      iii. All your friends are perfect
      iv. At least one of your friends is perfect
      v. Everyone is your friend is perfect
5. a) What do you mean by mathematical induction? Prove that $3^n - 1$ is a multiple of 2 using mathematical induction. 5
   b) Prove that if n is an integer and 3n+2 is odd, then n is odd. 5
   c) Using mathematical induction, prove that $1.1!+2.2!+ \ldots + n.n! = (n+1)! - 1$, where n is a positive integer. 5
6. a) Solve the recurrence relation $a_n = 2a_{n-1} + a_{n-2} - 2a_{n-3}$ for $n >= 3$, $a_0 = 3$, $a_1 = 6$ and $a_2 = 9$. 7
   b) Design DFA over $\sum = \{0, 1\}$ which accepts: 8
      i. The set of strings with even number of 1s and even no of 0s.
      ii. The set of strings that do not contain two consecutive 0s.
7. Write short notes on **any two**: 2×5
   a) Nested Quantifier
   b) Universal and Existential quantifiers
   c) "A proof by contraposition"

POKHARA UNIVERSITY

Level: Bachelor Semester: Fall Year : 2019
Programme: BCA Full Marks: 100
Course: Java Programming Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.
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Attempt all the questions.

1. a) What is an array? Explain multi-dimensional array with suitable example. 7
   b) What are access modifiers? Explain in brief different access modifiers in Java and its uses? 8
2. a) Why do we need to set thread priority? What are the different level of thread priority? Explain with an example. 8
   b) What is an applet? How is it different from java application. 7
3. a) List the different layout managers. Explain in brief GridBagLayout Class. 8
   b) Write a program in Swing to create login form, validate and save the data into the database. 7

OR

Write a program in java to read text file say read.txt, count the number of text "The" in that file and display the count into the console.

4. a) Write a program to read the website of the pokhara university and display the result. 8
   b) What is socket programing? Write TCP/IP based client-Server program. 7
5. a) Write a java program to design an GUI application that reads teacher information like as TchId, TchName, TchAdd, TchPhone and store into a database called 'College' when user clicks on a Button(Add). 8
   b) What is JDBC? How is it different from ODBC? 7

OR

Explain the detail steps involved in making database connection with example.

6. a) Write a java program to input three numbers and find out the largest number. Do it by using generic function. 8
   b) How do you achieve polymorphism through Generic in Java. 7
7. Write short notes on **any two**: 2×5
   a) UnChecked Exception
   b) InetAddress class
   c) Event Handler

POKHARA UNIVERSITY

Level: Bachelor Semester: Fall Year : 2019
Programme: BCA Full Marks: 100
Course: Computer Architecture Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

1. a) What is computer organization? Describe the addressing modes use in computer. 8
   b) What is microoperations? Explain different shift microoperations used in computer with example. 7
2. a) Perform (4) × (-3) using Booth's algorithm. 8
   b) What is control memory? How microprogrammed control unit works? 7
3. a) What is control unit? Explain the inputs and outputs of control unit. 8
   b) What is memory hierarchy? Describe direct and set-associative mapping. 7
4. a) Explain different levels of RAID with their advantages and disadvantages. 7
   b) How interrupt driven I/O is different from DMA? Describe the working mechanism of DMA. 8
5. a) Assume that pipeline has K=8 segment and executes n=100 tasks in sequence. Let the time taken to process a sub-operation in each segment is 30 sec. calculate the speed up ratio in the pipeline. 7
   b) Explain the techniques of solving hazards on pipelining. 8
6. a) What is multiprocessor system? Describe the interconnection structures in multiprocessor. 8
   b) Describe the hardware and software performance issues of multicore organization. 7

7. Write short notes on **any two:** 2×
   a) Design principles for modern system
   b) Arithmetic pipelining
   c) Multithreaded Architecture

POKHARA UNIVERSITY

Level: Bachelor
Programme: BCA
Course: Software Engineering

Semester: Fall

Year : 2019
Full Marks: 100
Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

1. a) What is software engineering? In what way is software engineering different from system engineering? Explain. 7
   b) Define software specification styles. Briefly define a use case diagram, sequence diagram, collaboration diagram. 8
2. a) Define the term Test Cases? Explain different types of testing. 8
   b) How do you justify functional testing and non-functional testing are complementary to each other? Give your views with suitable example. 7
3. a) What is SQA? Write down its important role in software engineering for quality management? Discuss SQA activities. 7
   b) Explain Formal Technical Review? Explain the guidelines for Review. 8
4. a) Explain the Clean Room Process. Describe the Clean Room Development Process and Clean Room Certification process. 7
   b) Define RAS. Are they interrelated? If yes then justify with suitable example. 8
5. a) What is risk management? Explain in brief the different aspects in risk management. 8
   b) Explain in brief the LOC and function point metrics for project size estimation. 7
6. a) What is object-oriented paradigm? Discuss recursive/parallel model work. 8
   b) What is software engineering emerging trend? Which trend do you prefer and why? 7
7. Write short notes on **any two:**
   a) Alpha Testing Vs. Beta Testing
   b) The clean room process
   c) CORBA