POKHARA UNIVERSITY

Level: Bachelor　　　　Semester: Fall　　　　Year　　　: 2019
Programme: BE　　　　　　　　　　　　　　Full Marks: 100
Course: Mathematical Foundation of Computer　　Pass Marks: 45
　　　Science　　　　　　　　　　　　　　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)　How can you show that two graphs are isomorphic? Discuss invariants　8
　　　that can be used to show that two graphs are not isomorphic with
　　　suitable example.

　　b)　What is Euler's formula for planar graphs? How can Euler's formula　7
　　　for planar graphs be used to show that a simple graph is non-planar.

2.　a)　Explain different graph representation technique with suitable　8
　　　example.

　　b)　What is minimum spanning tree? Find the minimum spanning tree of　7
　　　the graph using Kruskal's algorithm.
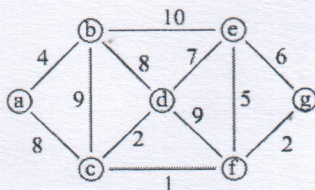
3.　a)　Differentiate between universally quantified and existentially　7
　　　quantified statements. What is the truth value of the statement, $x^2-1>0$
　　　for every real number **x**.

　　b)　Use mathematical induction to show that if $r \neq 1$ then　8
　　　$a+ar^1+ar^2+\ldots+ar^n=a(r^{n+1}-1)/(r-1)$.

4.　a)　Hypothesis: "Everyone in the Discrete Math class loves proofs.　7
　　　Someone in the discrete math class have never taken calculus.
　　　Conclusion "Someone who loves proof has never taken calculus." Use
　　　rule of inference to prove it.

　　b)　i) Use direct proof to prove "if x is odd than x^2 is also odd.　4+4

ii) Show by giving a proof by contradiction that if 100 balls are placed in 9 boxes Some box contains 12 or more balls.

5. a) Define linear homogeneous recursion relation of degree K with constant coefficient with suitable examples. What is the solution of the recurrence relation $a_n = a_{n-1} - 2a_{n-2}$ with $a_0 = 2$ and $a_1 = 7$ 8

    b) Suppose that a person deposits Rs. 10,000/- in a fixed account at a bank yielding 11% per year with interest compounded annually. How much will be in the account after 10 years? Solve the problem with modeling it into recursion relations.   7

6. a) Define deterministic finite state automata. Construct a DFA whose language is the set of strings that ends with 111 and contains odd number of one's.   7

    b) What is CFG? Write the CFG that can accept all the palindrome string over $\sum = \{0, 1\}$ and also construct derivation tree.   8

7. Write short notes on: (**Any two**)   2×5

    a) Tautology, Contradiction and Contingency

    b) Euler Graph

    c) Chomsky hierarchy of grammar