POKHARA UNIVERSITY

Level: Bachelor | Semester: Spring | Year : 2025

Programme: BE | Full Marks : 100

Course: Problem Solving Techniques (New) | Pass Marks : 45

Time : 3 hrs

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) In PST class there are k students in the class. If K is even number then number of handshakes then will be the even or odd? If K is odd then will the number of handshakes will that takes place be even or odd? 7

   b) There are most adults than boys, more boys than girls, more girls than families. If no family has fewer than 3 children, ten what is the least number of families there could be? 8

2. a) Initiate the method for finding the formula for the sum of first k odd positive integer. 7

   b) A right-angled triangle has sides of length l, m, 10. Note that 10 is not the hypotenuse, and the both and m are integers. From this information, find l, m. 8

   OR

   Show that if the diagonals of a quadrilateral are perpendicular then sum of squares of one pair of opposite side of the quadrilateral equal the sum of squares of other pair of opposite sides.

3. a) Explain why it is impossible to have a polyhedron with 6 triangular faces meeting at each vertex. 7

   b) Solve the crypto arithmetic problem:

   NINA+SING=AGAIN 8

   OR

Draw an 8*8 magic square such that each row, each column and each diagonal add up to the same number. Explain in detail the process you used to draw such 8*8 magic square.

4. a) A ten-foot pole is dropped into a milling saw and randomly cut into three shorter poles. What is the probability that these three pieces will form a triangle. 7

   b) A game is played by two players. They begin with pile of 43 chips, all the same. For his or her move, a player may remove 2 to 8 chips. The player who removes the last chip wins. What strategy can the first players use so that he will always win. 8

5. a) Six people, named A, B, C, D, E, F are in the dining car of a train. They are one each from New York City, Chicago, Tulsa, St. Louis, Milwaukee and Atlanta. The following facts are known. 7

   i. A and the man from New York City are physicians.
   ii. E and the woman from Chicago are teachers.
   iii. The person from Tulsa and C are Engineers.
   iv. B and F are veterans of Gulf war, but the person from Tulsa has never served in the military.
   v. The person from Milwaukee is older than A
   vi. The person from Atlanta is older than C.
   vii. At St. Louis, B and the man from New York get off.
   viii. At San Francisco, B and the man from Milwaukee gets off.

6. a) There is two married couple that needs to cross the river. A small boat is available that will hold just two people at a time. The males involved are quite jealous. No woman can be left with a man unless her husband is also present. There are no other constraints. How can these four people cross the river? What is the fewest number of trips possible? 8

   b) Imagine the election involving three candidates A, B, C. There are 33 Votes. All voters vote and every voter gives near ranking to three candidates. The result is shown below.

Ranking	Number of Votes
ABC	10
ACB	4
BAC	2
BCA	7
CAB	3
CBA	7

We have three methods namely plurality method (who get the most votes in Winner). Borda method (candidates with best average Is winner) and Hare method (fewest votes' candidates is eliminated and votes are shared to second rank candidate method). Show that which method favors which of the candidates. 7

7. Write short notes on: (Any two) 2x5
   a) Mathematical Induction for 7^n-1 is divisible by 6.
   b) Explain impossible problems.
   c) Magic square