GLOBAL COLLEGE OF MANAGEMENT

**First Term Exam-2071**

Level: MBS-I F.M.: 100
Time: 2:00 Hrs. P.M.: 40
Subject: Research Methodology & Statistical Models
*Candidates are required to give their answers in their words as far as practicable.*

Attempt any TWO questions from each group. All questions are of equal value

**Group A**
**Research Methodology**

1. Define research. Explain the characteristics of scientific research. What are some of the ethical issues in research?
2. What is the hypothesis? What are its different types? Explain the features of good research hypothesis.
3. What is research design? Describe the features of descriptive research. How is it different from exploratory research?

**Group 'B'**
**Statistical Models**

4. (a) The probability of machine X working 24 hours without failure is 0.8 and the probability of machine Y working 24 hours without failure is 0.5. Find the probability that (i) both machines will work for 24 hours without failure (ii) only one machine will work for hours without failure.

   (b) Mr. Arjun feels that the probability that he will fail in finance course is 0.2 and probability that Mr. Mahesh will pass in same course is 0.9 and probability that both will pass the course. 0.72. What is the probability as least one of them will pass the course. Also calculate the probability both will fail.

5. (a) Kathmandu Metropolitan Police Department has implemented seatbelt laws for drivers and passengers for safety measure. It is known that 70% of the drivers wear their seatbelts when they drive. A police on duty selects a random sample of five drivers and counts the number who is wearing seatbelts. The number of drivers who wear seatbelts in the sample of five is a binomial random variable. Find the probability that

   i) Exactly three wearing seatbelts.
   ii) At least three wearing seatbelts
   iii) At the most two wearing seatbelts

   (b) A manufacturing firm produces steel pipes in three plants with daily production volumes of 500, 1000, and 2000 units respectively, According to past experience, it is known that 1%, 3% and 2% of their production are defective. A pipe selected at random from a day's production is found to be defective, find out
   (i) From which plant the pipe comes?
   (ii) What is the probability that it came from the first plant?

6. A developer of food for pigs would like to determine what relationship exists among the age of a pig when it starts receiving a newly developed food supplement, the initial weight of the pig, and the amount of weight it gains in a 1-week period with the food supplement. The following information is the result of a study of eight piglets:

| Piglet Number | $X_1$ Initial Weight (pounds) | $X_2$ Initial Age (weeks) | Y Weight Gain |
|---|---|---|---|
| 1 | 39 | 8 | 7 |
| 2 | 52 | 6 | 6 |
| 3 | 49 | 7 | 8 |
| 4 | 46 | 12 | 10 |
| 5 | 61 | 9 | 9 |
| 6 | 35 | 6 | 5 |
| 7 | 25 | 7 | 3 |
| 8 | 55 | 4 | 4 |

**Required:**
(a) Calculate the least-squares equation that best describes these three variables.
(b) How much might we expect a pig to gain in a week with the food supplement if it were 9 weeks old and weighed 48 pounds