Bachelor level/ B.E. Civil/ 4th Semester

Time: 3 hours

Subject: Probability And Statistics (SH441/SH204)

Full Marks: 50

Pass Marks: 25

- *Attempt all the questions*
- *Figures in the margin indicate full marks.*
- *Assume suitable values, with a stipulation, if necessary.*
- *Candidates are required to answer the questions in their own words as far as possible.*

1. a) Let X is normal variable with mean 14 and variance 15. Find out the probability of following.

   $X \leq 12$, $X \geq 17$, $0 \leq X \leq 20$. (4)

   b) Define statistics and it's important in engineering. Two brothers Mr. X and Mr. Y appear in an interview for getting the scholarship. The scholarship can be Provide for two persons. The probability of getting scholarship by Mr. X is $\frac{1}{7}$ and getting Mr Y is $\frac{1}{5}$. What is the probability that i) Both of them will get scholarship? ii) Any one of them gets scholarship? (1+3)

   c) Calculate mean deviation from mean and their coefficients from the following data.

CI	10-20	20-30	30-40	40-50	50-60	60-70	70-80
f	15	14	16	20	15	11	9	(2)

2. a) Define the probability density function (p. d. f.). Show that the following function is probability density function.

   $f(x) = 0$ if $0 < x < 2$

   $= \frac{1}{22}(5 + 2x)$ if $2 \leq x \leq 4$

   $= 0$ if $x > 4$. (1+3)

   b) Defined Negative Binomial distribution. If a boy is throwing stone at a target, what is the probability that his 10th throw is his 5th hit, If the probability of hitting the target at any trail is 0.5? (2+4)

3. a) A food inspector, examine a random sample of 12 jars of a certain brand of peanut butter obtain the following percentage of impurities. 2.5, 1.9, 2.1, 2.8, 2.3, 3.6, 2.0, 1.8, 2.1, 2.3
   Find sample mean, variance and standard error of the sample mean. (4)

   b) Define confidence interval estimate for population? A random sample of 12 value from a normal population showed a mean of 31.9 inches and sum of square of deviation from this mean equal to 125 square inches. Obtain an 98% and 99% fiducially limits for μ. (6)

4. a) The following are the number of minutes it took 6 machines to assemble a price of machinery in the morning X and in the late afternoon Y.

X:	10.1	11.3	12.0	16.1	13.7	19.5
Y:	10.9	14.2	13.8	21.5	13.2	21.1

   Calculate correlation coefficient. (4)

   b) In a sample of 1000 peoples in Kathmandu district, 540 speak Nepali and rest speaks Newari. Can we assume that both languages are equally popular in this district at 1% and 5% level of signification? (6)

5. a) Write about multiple correlation coefficient, also given that $r_{12}=0.67$, $r_{13}=0.72$, $r_{23}=0.82$. Obtain the value of $R_{1.23}$ and $R_{3.12}$. (4)

   b) An experiment was run to determine that effect of a new type drug on blood pressure; six persons have their blood pressure measure before and after the drugs given.

Persons	1	2	3	4	5	6
After	116	118	120	124	128	130
before	119	124	126	128	121	135

   By using t-test, test the hypothesis that new drug will rise blood pressure at $\alpha=0.05$. (6)

The End