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*A Guide to eduRealm in NEPAL*



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Bachelor Level/First Year/First Semester/Science  
Computer Science and Information Technology (CSc.102)  
(Fundamental of Computer Programming)

Full Marks: 60  
Pass Marks: 24  
Time: 3 hours

Candidates are required to give their answer in their own words as for as practicable.  
All questions carry equal marks.

Attempt all questions.

1. Draw the flow chart for the solution of a quadratic equation and write an algorithm and explain it.
2. Find the value of “a” in each of the following statements:  
int i=2, j=5, k=7;  
float a=1.5, b=2.5, c=3.5;  
(a)  $a=c-i/j+c/k$ ;  
(b)  $a=(c-i)/k+(j+b)/j$ ;  
(c)  $a=b*b-((I+j)/c)$ ;  
(d)  $a=b-k+j/k+i*c$ ;  
(e)  $a=(b+4)\%(c+2)$ ;
3. A machine is purchased which will produce earnings of Rs.20000 per year while it lasts. The machine costs Rs.120000 and will have a salvage value of Rs.20000 when it is condemned. If the 12 percent per annum can be earned on alternative investment compared to alternative investments?
4. Write a program to transpose the following matrix.

$$A = \begin{bmatrix} -3 & 7 & 5 & -2 & 8 \\ 2 & 5 & 8 & 3 & -4 \\ -6 & 9 & 3 & 6 & 5 \end{bmatrix}$$

5. Write a program that uses a do ..... while loop to compute and prints the sum of square given n numbers.
6. Write a function to multiply two n×n matrices.
7. Write a program to count the number of words in a sentence.
8. Why pointer is called jewel of C language? Write a program that uses pointers to copy an array of integer.

OR

Explain the importance of pointer. Write a function that is passed an array of n pointers to floats and returns a newly created array that contains those n float values.

9. Define a structure of student having data members name, address, marks in C language and marks in information system. Take data for n students in an array dynamically and find the total marks obtained.
10. Some text file is given create another text file replacing the following words “Ram” to “Hari”, “Sita” to “Gita”, “Govinda” to “Shiva”.

OR

What are the uses of graphical function? Explain the basic graphical function with suitable program.

Bachelor Level/First Year/First Semester/Science  
Computer Science and Information Technology (CSc.101)  
(Introduction to Information Technology)

Full Marks: 60  
Pass Marks: 24  
Time: 3 hours

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

Long Question:

Attempt any two questions:

(2×10=20)

1. What do you mean by Internet? Explain the advantages and disadvantages of Internet.
2. Explain the functions of an operating system.
3. What are the major characteristics of computer? Explain.

Short Questions:

Attempt any eight questions

(8×5=40)

4. What is the function of memory?
5. Describe the working principle of processor.
6. Differentiate between random access devices and sequential access device.
7. What are the different kinds of input devices?
8. What is system software?
9. What do you mean by multiprocessing?
10. Differentiate between third generation languages and fourth generation languages.
11. What do you mean by normalization?
12. What do you mean by TCP / IP and how does it work?
13. What are the major characteristics of the intranet?

Bachelor Level/First Year/First Semester/Science  
Computer Science and Information Technology (Stat.103)  
(Probability and Statistics)

Full Marks: 60  
Pass Marks: 24  
Time: 3 hours

Candidates are required to give their answer in their own words as far as practicable.  
All notations have the usual meanings.

Group A

Attempt any Two:

(2×10=20)

1. State Bay's Theorem.

In a certain assembly plant, three machines  $B_1$ ,  $B_2$ , and  $B_3$  make 30%, 45% and 25% respectively, of the product. It is known from past experience that 2%, 3% and 2% of the products made by each machine, respectively, are defective. If a product were chosen randomly and found to be defective, what is the probability that it was made by machine  $B_3$ ?

2. (a) Explain point estimation and interval estimation. What are the criteria of good estimator?  
(b) If  $\bar{X} = 50$ ,  $S=15$ ,  $n=16$ , and assuming that the population is normally distributed, estimate the standard error of the sample mean and estimate 99% confidence interval for the population mean  $\mu$ .
3. (a) Define Karl Pearson's correlation coefficient and state its properties.  
(b) The following table shows the production of coal and the number of wage earners in the coal industry over a ten year period during which the capital equipment has remained constant.

Output in tons (Y)	21	21	20	18	17	17	14	13
No of workers (X)	70	68	65	50	47	47	44	43

Determine the fitted regression line and predict Y for  $X=55$ .

Group B

Answer any eight questions:

(8×5=40)

4. The following data represent the total fat for burgers from a sample of fast-food chains.

19    31    34    35    39    39    43

Compute mean, median and mode then describe the shape of the distribution.

5. What is axiomatic definition of probabilities and what are its properties?  
6. If two random variables  $X_1$  and  $X_2$  have the joint probability density.

$$f(x_1, x_2) = \frac{2}{3}(x_1 + 2x_2), \text{ for } 0 < x_1 < 1, 0 < x_2 < 1$$
$$= 0, \text{ elsewhere}$$

Find the conditional density of  $X_1$  given  $X_2=X_2$ .

7. Prove that  $\text{Var}(X+y) = \text{Var}(X) + \text{Var}(Y) + 2\text{Cov}(X, Y)$ .
8. Find the first and second moments of binomial distribution and also compute variance for the binomial distribution.
9. Service calls come to a maintenance center according to a Poisson process and on the average 2.7 calls come per minute. Find the probability that no more than 4 calls come in any period.
10. In a photographic process, the developing time of prints may be looked upon as a random variable having the normal distribution with a mean of 16.28 seconds and a standard deviation of 0.12 second. Find the probability that it will take (i) anywhere from 16.00 to 16.50 seconds to develop one of the prints, (ii) at least 16.20 seconds to develop one of the prints.
11. Obtain the maximum likelihood estimate for mean ( $\mu$ ) and variance ( $\sigma^2$ ) of the normal distribution.
12. Define canonical definition of t-distribution. Discuss some of its properties.
13. It is claimed that an automobile is driven on the average more than 20,000 kilometers per year. To test this claim, a random sample of 100 automobile owners are asked to keep a record of the kilometers they travel. Would you agree with this claim if this random sample showed an average of 23,500 kilometers with a standard deviation of 3900 kilometers?

Bachelor Level/First Year/First Semester/Science  
Computer Science and Information Technology (Stat.108)  
(Statistics I)

Full Marks: 60  
Pass Marks: 24  
Time: 3 hours

Candidates are required to give their answer in their own words as far as practicable.  
All notations have the usual meanings.

Group A

Attempt any Two:

(2×10=20)

- Describe in detail stratified random sampling method for drawing a random sample of size  $n$  from a population of size  $N$ . Write down the expression for an unbiased estimator  $\bar{y}_{st}$  of population mean  $\bar{Y}$  and derive an expression for  $\text{Var}(\bar{y}_{st})$  when samples were drawn from each stratum by adopting simple random sampling without replacement method. Also find  $\text{Var}(\bar{y}_{st})$  under the scheme of proportional allocation of sample sizes to strata.
- Write down the rationale and method of Wilcoxon matched-pairs signed rank test. Seven prospective graduate students took a test twice with the following scores.

First attempt	470	530	610	440	600	590	580
Second attempt	510	550	600	490	585	620	598

Compute the value of  $T^+$  where  $T^+$  is the sum of ranks of the positive differences (second attempt – first attempt) Using  $T^+$  as test statistic carry out the test of the following hypothesis at level 0.05.

$H_0$ : there is no statistical difference between the first and second attempt score

$H_1$ : second attempt score tends to be larger than the first attempt score.

- To study the effect of age ( $X_1$  in years) and weight ( $X_2$  in lbs) on systolic blood pressure ( $Y$  in mm Hg), the data were recorded for a sample of 15 adult males. The estimated regression model based on data is described below in the box where figures within parenthesis are standard error of the estimate. Further computation shows that

$$\sum (Y_i - \bar{Y})^2 = 1835.7 \quad \text{and} \quad \sum (Y_i - \hat{Y}_i)^2 = 1101.3$$

$$\hat{Y} = 27.4 + 0.22X_1 + 0.56X_2$$

(24.68)    (0.248)    (0.155)

- Explain the meanings of the estimated slope regression coefficients of the model.
- What value of  $Y$  would you predict if  $X_1=55$  and  $X_2=175$ ?
- Compute the value of  $R^2$  and interpret it.
- Carry out the overall goodness-of-fit test of the model at 5% level of significance.
- Test the significance of slope regression coefficient at 5% level of significance.

Group B

Answer any eight questions:

(8×5=40)

- Describe in detail systematic sampling method when  $N=k \times n$ . Describe problems that will arise in systematic sampling method when  $N \neq k \times n$ .
- If  $V_{srswr}$  and  $V_{srswor}$  correspondingly denote that variance of unbiased estimator of the population mean under simple random sampling with and without replacement method, then show that  $(V_{srswr} - V_{srswor}) = \frac{n-1}{Nn} S^2$  and write your conclusion based on this result.
- Consider the problem of determining if a die is fair or not. For this a die is rolled for 60 times and observed the following outcomes.

Side	1	2	3	4	5	6	Total
Number of times observed	8	9	13	7	15	8	60

Test the hypothesis  $H_0$ : the die is fair, that is, all sides have  $1/6$  chance of appearing against  $H_1$ : the die is unfair at level 0.05.

- Describe the methods of Mann Whitney test.

8. Suppose that an IQ test is given to eleven randomly selected pairs consisting of one brother and one sister from the same family. To test the null hypothesis that this sample was drawn from a population in which the median IQ of a brother and sister do not differ against the alternative hypothesis that the sister would score higher than brother. IQ scores are summarized below.

Sister' score	129	111	117	120	116	101	107	127	105	123	113
Brother's score	115	108	123	104	110	98	106	119	95	130	101

Using sign test carry out the above said hypothesis at 5% level of significance.

9. Describe rationale and method of Krukal – Wallis one-way ANOVA test.
10. Suppose in a multiple regression model problem, the ANOVA table is as follows. How many independent variables are in model? What is the sample size? What is the value of R<sup>2</sup>? Carry out the overall goodness-of-fit test of the model at 5% level of significance.

Source	SS	Df
Regression	36	2
Error	64	32

11. Explain the meaning of multicollinearity. How do you detect the problem of multicollinearity in multiple regressions?
12. Describe the Cobb-Douglas production function model with its application.
13. Define partial correlation coefficient. If  $r_{12}=0.33$ ,  $r_{13}=0.40$ , and  $r_{23}=0.76$ , then compute  $r_{13.2}$  and  $r_{23.1}$ .