BACHELOR OF COMPUTER APPLICATIONS
(BCA)

(Revised Syllabus)

ASSIGNMENTS

(July – 2023 & January - 2024)

(BCS-040, MCS-024, BCS-041, BCS-042,

MCSL-016, BCSL-043, BCSL-044, BCSL-045)

ignou
THE PEOPLE'S
UNIVERSITY

**SCHOOL OF COMPUTER AND INFORMATION SCIENCES
INDIRA GANDHI NATIONAL OPEN UNIVERSITY
MAIDAN GARHI, NEW DELHI – 110 068**

CONTENTS

Important Notes

1. Submit your assignments to the Coordinator of your Study Centre on or before the due date.

2. Assignment submission before due dates is compulsory to become eligible for appearing in corresponding Term End Examinations. For further details, please refer to BCA Programme Guide.

3. To become eligible for appearing the Term End Practical Examination for the lab courses, it is essential to fulfill the minimum attendance requirements as well as submission of assignments (on or before the due date). For further details, please refer to the BCA Programme Guide.

Course Code	:	BCS-040
Course Title	:	Statistical Techniques
Assignment Number	:	BCA(IV)040/Assignment/2023-24
Maximum Marks	:	100
Weightage	:	25%
Last Date of Submission	:	31st October, 2023 (For July session)
		30th April, 2024 (For January session)

Note: This assignment has 8 questions of 80 marks (each question carries equal marks). Answer all the questions. Answer all the questions. Rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation.

Q1. Calculate the mean and standard deviation for the following data: **(10)**

0-10	7
10 — 20	8
20 — 30	10
30 — 40	36
40 — 50	12
50 — 60	17
60 — 70	10

Q2. Given the following sample of 20 numbers: **(10)**

15 45 52 43 50 59 41 47 56 79 72 18 45 54 78 12 41 48 58 14

(i) Compute mean, variance and standard deviation.

(ii) If the largest value in the above set of numbers is changed to 500, to what extent are the mean and variance affected by the change? Justify your answer.

Q3. **(10)**
(a) Write two merits and two demerits of Median.
(b) An incomplete frequency distribution is given as follows
12 30 ? 65 25 18

C.I.	Frequency
10 – 20	12
20 – 30	30
30 – 40	?
40 – 50	65
50 – 60	?
60 – 70	25
70 – 80	18

Given that median value of 200 observations is 46, determine the missing frequencies using the median formula.

Q4. Box X contains 5 red and 4 blue balls, Box Y contains 2 red and 5 blue balls. A ball is drawn at random from each box. Find the probability of drawing one red and one blue ball. **(10)**

Q5. A Manager of a car company wants to estimate the relationship between age of cars and annual maintenance cost. The following data from six cars of same model are obtained as:

Age of Car (in years)	Annual Maintenance Cost (In hundred rupees)
1	10
2	15
3	18
4	20
5	25
6	35

(a) Construct a scatter diagram for the data given above. **(3)**

(b) Fit a best linear regression line, by considering annual maintenance cost as the dependent variable and the age of the car as the independent variable. **(2)**

(c) Use this regression line to predict the annual maintenance cost for the car of age 8 years. **(5)**

Q6. Suppose A and B are two independent events, associated with a random experiment. If the probability of occurrence of either A or B equals 0.6; while probability that only A occurs equals 0.4, then determine the probability of occurrence of event B. **(10)**

Q7. A chemical firm wants to determine how four catalysts differ in yield. The firm runs the experiment in three of its plants, types A, B, C. In each plant, the yield is measured with each catalyst. The yield (in quintals) are as follows:

Plant	Catalyst			
	1	2	3	4
A	2	1	2	4
B	3	2	1	3
C	1	3	3	1

(a) Perform an ANOVA and comment whether the yield due to a particular catalyst is significant or not at 5% level of significance. Given $F_{3,6} = 4.76$. **(5)**

(b) Construct ANOVA table for one-way classification. **(5)**

Q8. Explain the following with the help of an example each: **(10)**

a) Binomial distribution

b) t-test for mean

c) Properties of good estimator

d) F-test for Equality of two variances

Course Code	:	MCS-024
Course Title	:	**Object Oriented Technologies and Java Programming**
Assignment Number	:	**BCA (IV)/024/Assignment/2023-24**
Maximum Marks	:	**100%**
Last Date of Submission	:	**31st October, 2023 (For July session)**
		30th April, 2024 (For January session)

There are Four questions in this assignment which carried 80 marks. Rest 20 marks are for viva-voce. Answer all the questions. Give appropriate comments in programs to increase understandability. Wherever required, you may write java program, run it on machine and take its output as part of solution. Please go through the guidelines regarding assignments given in the Program Guide for the format of presentation.

Q1. What is Abstraction? How does Object Oriented Programming differ from Procedural Programming? Explain with examples. **(20)**

Q2. What is meant by **interface** in Java? Explain its use with an example. **(20)**

Q3. What is meant by **thread** in Java? Explain its use with an example. **(20)**

Q4. What is AWT? How does it differ from swing ? **(20)**

Course Code	:	BCS-041
Course Title	:	**Fundamentals of Computer Networks**
Assignment Number	:	**BCA (IV)/041/Assignment/2023-24**
Maximum Marks	:	**100**
Weightage	:	**25%**
Last Date of Submission	:	**31st October, 2023 (For July Session)**
		30th April, 2024 (For January Session)

This assignment has eight questions for a total of 80 marks. Answer all the questions. Each question carries 10 marks. Rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation.

Q1. **(10)**

   (a) Differentiate between single mode and multi-mode optical fiber.
   (b) Briefly discuss the functions of various layers involved in TCP/IP model, also mention the protocols defined under each layer.

Q2.
                                                 (10)

   (a) What is count-to-infinity problem in distance vector routing protocol? How does it happen? Explain with an example.
   (b) Define angle modulation. What are its types? Discuss the limitations of angle modulation.

Q3. **(10)**

   (a) Calculate the CRC for bit sequence 1101011011 and generator polynomial is 10011.
       Note: Show all steps and calculation.
   (b) What is Ad hoc Wireless Communication System? Explain.

Q4. **(10)**

   (a) What is ICMP? Discuss the ICMP message categories. Also, give at least two examples of each ICMP message category.
   (b) What is NIC? Write the techniques used by NIC for data transfer.

Q5. **(10)**

   (a) Write the steps for Message Digest 5 (MD5) algorithm.
   (b) Compare Hub and Switch. Give the advantages and disadvantages of both Hub and Switch. Briefly discuss the functions of layer-2 switch and layer-3 switch.

Q6. **(10)**

   (a) Explain POP and IMAP. How does POP work? What are the advantages of IMAP over POP?
   (b) Assume two prime numbers p and q are 3 and 5 respectively. Calculate private key and public key using RSA algorithm.

Q7. (10)

    (a) Compare between CSMA/CD and token passing methods in Ethernet. Also explain how collisions are handled by CSMA/CD.

    (b) What is round robin technique for transmission? How does polling differ from token passing?

Q8. (10)

    (a) What is distance vector routing? Briefly discuss the problem of distance vector routing.

    (b) What do you understand by the term Quality of Services (QoS). Discuss the techniques to improve QoS.

Course Code	:	BCS-042
Course Title	:	**Introduction to Algorithm design**
Assignment Number	:	**BCA(IV)/042/Assignment/2023-24**
Maximum Marks	:	**100**
Weightage	:	**30%**
Last date of Submission	:	**31st October, 2023 (For July Session)**
	:	**30th April, 2024 (For January Session)**

This assignment has 08 questions of 10 Marks each, answer all questions. Rest 20 marks are for viva voce. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation.

Q1. Define asymptotic analysis and explain the three notations which are primarily used for asymptotic analysis with the help of examples. **(10)**

Q2. (a) Define Tower of Hanoi problem as a recurrence relation problem and solve it through a recurrence tree. **(5)**

(b) What is Master Method? Write all the three cases of Master Method to solve the following recurrence relation: **(5)**
$$T(n) = aT(n/b) + f(n) \text{ and explain.}$$

Q3. (a) Find the optimal solution to the fractional Knapsack problem using Greedy technique: **(5)**
Number of objects n: 6
Maximum Weight M = 25
Value of each item:
$(P_1, P_2, P_3, P_4, P_5, P_6) = (10, 20, 30, 35, 45, 55)$
Weight of each item:
$(W_1, W_2, W_3, W_4, W_5, W_6) = (5, 10, 12, 13, 15, 20)$

(b) Perform the multiplication of the following two matrices A and B using Strassen's method showing all the intermediate steps. **(5)**

$$A = \begin{matrix} 5 & 12 & 15 & 4 \\ 8 & 20 & 10 & 3 \\ 30 & 24 & 11 & 9 \\ 6 & 2 & 14 & 16 \end{matrix} \qquad B = \begin{matrix} 10 & 13 & 17 & 26 \\ 8 & 15 & 28 & 27 \\ 6 & 14 & 35 & 32 \\ 23 & 20 & 22 & 19 \end{matrix}$$

Q4. Write a pseudocode of evaluating polynomial expression using Horner's rule and perform complexity analysis (step by step). Apply it to evaluation the polynomial expression: **(10)**
$P(x) = 3x^6 + 4x^5 + 2x^4 + 2x^3 + 8x + 9$

Q5. Write pseudocode for left to right binary exponentiation evaluation. Apply the algorithm `for evaluating a^{280} and show a step by step result. **(10)**

Q6. Write Kruskal's algorithm for finding minimum cost spanning tree using greedy approach and apply to the following graph and show step by step results **(10)**
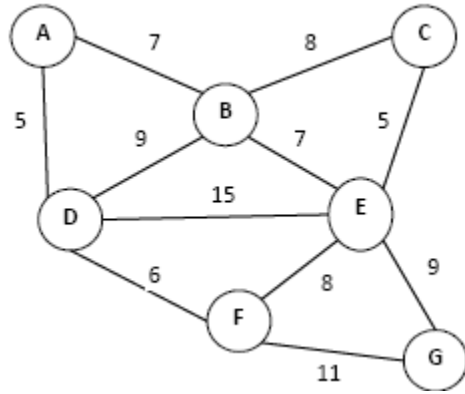
Q7. What is edge relaxation technique in shortest path algorithm? Write and apply Bellman Ford's algorithm to find the shortest path from a node A to all the remaining nodes in the following graph:

(10)
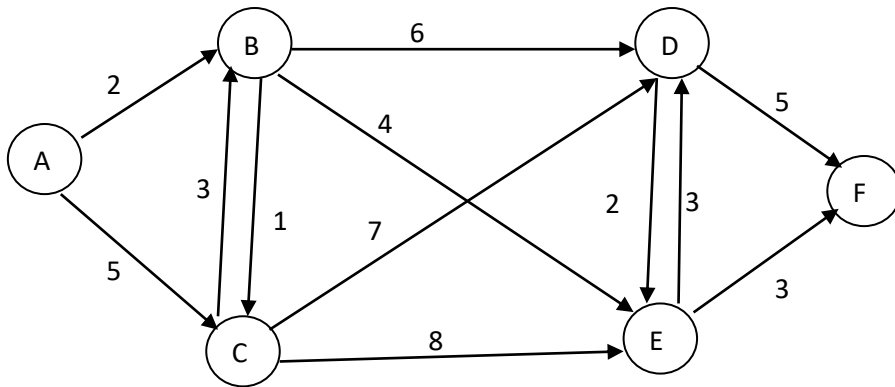
Q8. Write Quick Sort algorithm to sort the following list of integer numbers. Show all the intermediate steps

$$15, 12, 18, 5, 6, 8, 22, 3, 25, 30, 35, 8, 32$$

Also compute the worst case time complexity of the algorithm. **(10)**

Course Code	:	MCSL-016
Course Title	:	Internet Concepts and Web Design (Lab Course)
Assignment Number	:	BCA(IV)/L-016/Assignment/2023-24
Maximum Marks	:	100
Weightage	:	25%
Last Dates for Submission	:	31st October, 2023 (For July Session)
		30th April, 2024 (For January Session)

There are two questions in this assignment carrying a total of 80 marks. Rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation. Submit the screenshots along with the coding and documentation.

Q1. **(70)**

An e-Commerce website maintains the list of its products and sellers. The website displays the list of the items, the seller who sells those items and the price of the items. In addition, it also displays a form for seller registration and a form for the customer for feedback about the website. Design and create four web pages for the e-Commerce company namely, *Home*, *Items*, *Seller_Registration* Form and *Feedback,* having the following features:

For consistency, every webpage of website should consist of three basic divisions –

Header – This division should be the same for all four web pages and should display the name and logo of the e-commerce company. This division should be in different background colour.

PageList - This division should be the same for every web page. It should contain links to all the web pages, viz. *Home*, *Items*, *Seller_Registration* Form and *Feedback* form.

Content - This division should display the basic information as given below. The web pages that you are designing should differ in this Division only.

The Content division of the different pages should be as under:

- The *Home* page should include a message from the e-commerce company, welcoming all the customers to the website.

- The *Item* page should display information about all the items being sold. It should include the item name, specification, item price etc. You should display this information by using a table.

- The *Seller_Registration* page should contain a form, which should have fields – Seller name, phone number, address and a Submit button. You should write JavaScript code to

verify that all the fields are filled with some data. This code should be run when the Submit button is pressed.

- The *Feedback* page should display another form that has three input fields – The name of the customer, the reason for feedback and a text area for giving the feedback. In addition, this form should have a Submit button.

Q2. **(10)**

List one of the ways of using CSS along with an HTML file. List the features of Angular Framework.

Course Code	:	**BCSL-043**
Title	:	**Java Programming Lab**
Assignment Number	:	**BCA(IV)/L-043/Assignment/2023-24**
Maximum Marks	:	**50**
Last date of Submission	:	**31ˢᵗ October, 2023 (For July Session)**
		30ᵗʰ April, 2024 (For January Session)

This assignment has two questions. Answer all the questions. These questions carry 40 marks. Rest 10 marks are for viva voce. You are advised to give proper comments and do proper alignments while writing program. Please go through the guidelines regarding the assignments given in the programme guide for the format of presentation.

Q1. (a) Write java program to find sum of two matrices. Define appropriate class, constructor and methods in your program. Make necessary assumptions. **(10)**

(b) Write a java program which take age (in years) of two persons as input and display who is older among them. Make provisions for exception handling in the situation when age entered is either a negative value or more than 150. **(10)**

Q2. (a) Write a program in java program which read the given text file and display its contents on console. Make suitable provisions of exceptions handling in your program. **(10)**

(b) Create an applet which take a number between 1-50 as input and display its table. Use appropriate components, layout and formatting in your program. **(10)**

Course Code	:	BCSL-044
Course Title	:	Statistical Techniques Lab
Assignment Number	:	BCA(IV)/L-044/Assignment/2023-24
Maximum Marks	:	50
Weightage	:	25%
Last Dates for Submission	:	31ˢᵗ October, 2023 (For July Session)
		30ᵗʰ April, 2024 (For January Session)

Note: There are six questions in this assignment, which carries 80 marks. Rest 20 marks are for viva-voce. Answer all the questions. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation.

All the following questions must be performed using a statistical package. You may use any statistical package for this purpose.

Q1. The weight of 50 children in the age group 10-15 years, measured in Kilograms, is given below. Perform the tasks given in (i) to (iv) using a spreadsheet package: **(12)**

40	70	61	58	58	50	72	63	51	62
65	60	68	68	78	54	52	60	50	70
60	35	53	58	79	60	62	61	55	65
51	39	45	58	50	65	62	50	72	62
52	65	67	87	45	75	71	52	65	59

(i) Find the minimum and maximum weight using spreadsheet formula.
(ii) Divide the weight in 5 classes with class interval 10 and create the frequency distribution for these classes using Array formula .
(iii) Find the percentage of students, whose weight is in between 50 and 60 kgs.
(iv) Represent the frequency distribution with the help of a relevant graph.

Q2. Perform the following tasks using a spreadsheet (you must either enter necessary formula that are required to calculate the value or you may use spreadsheet function for the same): **(12)**

(i) Calculate the standard error, given a population of 250, sample size 50 and population standard deviation of 25.

(ii) Assume that a company manufactures Discs. The Discs should have a mean diameter of 2cm. A sample of 20 such Discs were taken out of 1000 such Discs The sample diameter of these Discs was 2.01 cm with a standard deviation of 0.01 cm. Can the

company say with 95% confidence that the Discs should be accepted. Make suitable assumption and justify your answer.

Q3. A company sells summer clothing. Fit a trend using any statistical software to sales data for this company. Make suitable assumptions. **(12)**

Month	Jan	Feb	Mar	Apr	May	June	July
Sales(in pieces)	400	700	2000	3000	2000	1000	200

Q4. The daily production of items of a company is given in the following table. Use spreadsheet software to find the moving averages for the length of 5. **(12)**

Day	Production (in Metric tons)
1	29
2	5
3	44
4	30
5	40
6	45
7	7
8	60
9	30
10	49
11	44
12	30
13	50
14	30
15	34

Q5. A company manufactures refills of pens. Five observations of refills are taken on each day. These observations were taken 6 times during a working day. Calculate the control limits for mean and range, and plot the control charts using any statistical software. Make suitable assumptions, if any. **(12)**

The data is given in the following table:

Sample No.	Point size of pen in mm
1	2.04, 2.01, 1.87, 1.85, 1.90
2	2.14, 2.11, 1.97, 1.95, 2.10
3	1.99, 2.21, 1.77, 1.98, 1.98
4	2.00, 2.05, 1.97, 1.95, 2.01
5	1.87, 2.14, 2.19, 2.20, 2.15
6	2.06, 1.91, 2.17, 2.05, 1.90

(Please take the suitable values of d_2, d_3, d_4, A_2 and other variables.)

15

Q6. A cloth making company experiments with quantity of cloth being produced by four of its machine. Assuming that company has four such machines and productivity of these machine is recorded on four different days in the following table. **(20)**

Day	Quantity of cloth per Machine			
	A	B	C	D
1	91	89	92	90
2	90	88	89	87
3	93	88	90	91
4	88	89	90	88

Perform an ANOVA using any software to test (at 5% level) whether all the four machines are equally productive. Make suitable assumptions, if any.

Course Code	:	**BCSL-045**
Course Title	:	**Introduction to Algorithm design Lab**
Assignment Number	:	**BCA(IV)/L-045/Assignment/2023-24**
Maximum Marks	:	**50**
Weightage	:	**25%**
Last date of Submission	:	**31st October, 2023 (For July Session)**
	:	**30th April, 2024 (For January Session)**

Note: Answer all the questions which carry 40 marks. All questions are of equal marks. The rest 10 marks are for viva voce. You are required to write programs in C-language for all the problems , execute and show the results. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation. Make suitable assumption if necessary.

Q1. Implement the Bubble Sort algorithm for sorting the following list of numbers, showing the list obtained at each step:

17, 25, 32, 4 ,7, 19 , 81, 45, 1, 33

Also calculate the total number of exchange operations and how many times the loop will execute in this algorithm

Q2. Implement Quick Sort algorithm to sort the following array:

5	70	44	39	25	25	7	12	27	6

and calculate number of comparisons and exchange operations in the program

Q3. Write a program to implement to reverse the following string :

" ABCDEFGHIJ"

and calculate (i) Total number of exchange operations
(ii) Total number of comparison operations
(iii) Total number of times the loop will execute

Q4. Implement the Binary Search Algorithm to search for a number 29 in the following array

14	7	22	24	39	20	90	10	15	6

and calculate how many comparison and division operations will be required for searching the number.

Q5. Apply Kruskal's algorithm to find a minimum cost spanning tree for the following graph: