BACHELOR OF COMPUTER APPLICATIONS (BCA)

(Revised Syllabus)

BCA(Revised Syllabus)/ASSIGN/SEMESTER-IV

ASSIGNMENTS

(July – 2021 & January - 2022)

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

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

SCHOOL OF COMPUTER AND INFORMATION SCIENCES
INDIRA GANDHI NATIONAL OPEN UNIVERSITY
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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(4)040/Assignment/2021-22**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Date of Submission	**:**	**31st October, 2021 (for July session)** **15th April, 2022(for January session)**

Note: This assignment has 8 questions of 80 marks (each question carries equal marks). 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: Given the following sample of 20 numbers: **(10 Marks)**

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

(a) Compute mean, variance and standard deviation.

(b) 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.

Q2: **a)** What are the various probability distributions, give respective formulas of each type of distribution. Now Solve the problem"The probability that at least one of the two independent events occurs is 0.5. Probability that the first event occurs but not the second is 3/25. Also the probability that the second event occurs but not the first is 8/25."Find the probability that none of the two events occurs. **(5 Marks)**

b) Which Probability distribution is applicable to the situation given below, give reasons in support of our response.

"Calls at a telephone switchboard occur at an average rate of 6 calls per 10 minutes. Suppose the operator leaves for a 5-minute coffee break. What is the probability that exactly two calls occur while the operator is away?" **(5 Marks)**

Q3: Two new types of petrol, called premium and super, are introduced in the market, and their manufacturers claim that they give extra mileage. Following data were obtained on extra mileage which is defined as actual mileage minus 10. **(10 Marks)**

Ordinary Petrol	1	2	2	1
Premium Petrol	2	2	1	3
Super Petrol	4	1	2	3

Using the above data perform the following:

(i) Using ANOVA, test whether premium or super gives an extra mileage.

(ii) What is your estimate for the error variance?

Q4: A Statistics professor has given five tests. A student scored 70, 75, 65, 80 and 95 respectively in the five tests. The professor decides to determine his grade by randomly selecting a sample of 3 test scores. Construct the sampling distribution for this process.

(10 Marks)

Q5: Following data are given for marks of a student in subject A and B in a certain examination: **(10 Marks)**

	SUBJECT A	**SUBJECT B**
MEAN MARKS	36	85
STANDARD DEVIATION	11	8

If coefficient of correlation between A and B marks of subject = ±0.66, then perform the following;

i) Determine the two equations of regression

ii) Calculate the expected marks in A corresponding to 75 marks obtained in B.

Q6: Construct 5- yearly moving averages from the following data **(10 Marks)**

YEAR	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
SALE	105	107	109	112	114	116	118	121	123	124	125	127	129

Q7: Which Probability distribution is applicable to the situation given below, give reasons in support of our response.

In 120 throws of a single dice, following distribution of faces was observed. **(10 Marks)**

FACES	1	2	3	4	5	6	TOTAL
F_0	30	25	18	10	22	15	120

From the given data, verify that the hypothesis "dice is biased" is acceptable or not.

Q8: Write Short Notes on following . **(10 Marks)**

a) Linear systematic sampling

b) Time series Analysis

c) Forecasting

d) CHI - SQUARE distribution

e) Goodness of Fit Test

Course Code	**:**	**MCS-024**
Course Title	**:**	**Object Oriented Technologies and Java Programming**
Assignment Number	**:**	**BCA (4)/024/Assignment/2021-22**
Maximum Marks	**:**	**100**
Last Date of Submission	**:**	**31st October, 2021 (for July session)** **15th April, 2022 (for January session)**

There are eight 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.

Question 1:

(a) Explain basic concepts of Object Oriented Programming? Explain how data hiding is achieved in java. **(5 Marks)**

(b) Explain different data types available in java. **(5 Marks)**

Question 2:

(a) Explain how class is defined in java with the help of a program. Also explain use of getter and setter methods. **(4 Marks)**

(b) Explain use of static methods in java. **(2 Marks)**

(c) Write a java program to add two matrices of 4X4 in java. **(4 Marks)**

Question 3:

Write a java program to create an Account class and define constructors in it. Inherit Saving_Bank_Accountclass andCurrent_Bank_Account class from the Account class. Override constructors of Account class in Saving_Bank_Account and Current_Bank_Account classes. Define appropriate methods to operate these accounts. Make necessary assumptions. Give proper comment in your program to increase redability. **(10 Marks)**

Question 4:

(a) Explain uses of final and super keywords in java with the help of examples. **(4 Marks)**

(b) What is a package in Java? Explain accessibility rules for packages. **(4 Marks)**

(c) Explain advantages of polymorphism with the help of example. **(2 Marks)**

Question 5:

(a) What is interface? Explain difference between abstract class and interface with the help of examples. Also write advantages of using interfaces in java programming. **(6 Marks)**

(b) What is an exception? Explain various causes of exceptions. With the help of a program explain how exceptions are handled in java. **(4 Marks)**

Question 6:

(a) What is multithreading? Explain how threads are synchronized in java. Also explain various applications where multithreading may be used. Describe how interthread communications takes place in java. **(8 Marks)**

(b) Create an Applet to draw circle on the basis of input given by user. **(2 Marks)**

Question 7:

(a) What is object serialization? Explain working and use of object serialization. **(3 Marks)**

(b) What is layout manager? Explain different layouts available in java for GUI programming. What is default layout of an applet? Explain how to set the layout of an applet. **(7 Marks)**

Question 8:

(a) What is proxy server? Explain URL class and its methods in java. **(3 Marks)**

(b) What is JDBC? Explain the advantages of JDBC. **(3 Marks)**

(c) Explain use of GET and POST methods of Servlet with the help of examples. **(4 Marks)**

Course Code	**:**	**BCS-041**
Course Title	**:**	**Fundamentals of Computer Networks**
Assignment Number	**:**	**BCA (4)/041/Assignment/2021-22**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Date of Submission	**:**	**31st October, 2021 (for July Session)** **15th April, 2022 (for January Session)**

This assignment has four questions for a total of 80 marks. Answer all the questions. Each question carries 20 marks. Rest 20 marks are for viva voce.

Q1: Explain the properties of Fibre Optic Cables. Also, compare them with other types of Cables for data transmission. **(20 Marks)**

Q2: What is a Network Interface Card (NIC)? Explain various techniques that are used by NIC for transferring data. **(20 Marks)**

Q3: Explain VoIP and IPTV. **(20 Marks)**

Q4: Explain Block and Stream Ciphers. **(20 Marks)**

Course Code	**:**	**BCS-042**
Course Title	**:**	**Introduction to Algorithm design**
Assignment Number	**:**	**BCA(4)/042/Assignment/2021-22**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last date of Submission	**:**	**31st October, 2021 (For July Session)**
	:	**15th April, 2022 (For January Session)**

Answer all the questions in the assignment which carry 80 marks in total. 20 marks are for viva voce. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation. Make suitable assumption if necessary. All algorithms should be nearer to C-language.

Q1: **(i)** Define asymptotic analysis and explain the three notations which are primarily used for asymptotic analysis with the help of examples. **(7 Marks)**

(ii) Write all the three cases of asymptotic analysis of the following sorting algorithms. **(6 Marks)**

- Bubble Sort
- Selection Sort

Q2: Find out the complexity of the following algorithm: **(5 Marks)**

function min (X_1, X_2……X_n)
min = X_1;
for i = 2 to n
if (min > Xi) then
min = Xi;

Q3: Write a binary search algorithm (non recursive version) and show the complexity analysis of the algorithm step by step. **(10 Marks)**

Q4: **(i)** Write an algorithm for the fractional knapsack using greedy approach and perform complexity analysis. **(5 Marks)**

(ii) Find an optimal solution for the Knapsack problem for n = 5 (the number of objects) and M (Knapsack capacity) = 10. Profit and weight of each object is as follows: **(10 Marks)**

(P_1, P_2, P_3, P_4, P_5)	=	(10, 25, 30, 15, 35)
(W_1, W_2, W_3, W_4, W_5)	=	(5, 7, 4, 8, 3)

Q5: **(i)** Write a pseudocode of evaluating polynomial expression using Horner's rule and perform complexity analysis (step by step) **(6 Marks)**

(ii) Apply the above algorithm to evaluation the following polynomial expression. **(4 Marks)**

$P(x) = 6x^6+5x^5+3x^4+2x^2+8x+9$

Q6: Multiply 3426 × 2569 using Divide and Conquer method (Apply Karatsuba' Method). **(5 Marks)**

Q7: Discuss all the three cases of master method to solve the recurrence $T(n) = aT\left(\frac{n}{b}\right) + f(n)\ where\ a \geq 1, b > 1.$ **(9 Marks)**

Q8: **(i)** Illustrate the operation of partition procedure used in Quicksort algorithm for the following array elements: **(10 Marks)**

45	35	10	25	18	15	22	11

(ii) Write a recurrence relation of Quick Sort Algorithm. **(3 Marks)**

Course Code	**:**	**MCSL-016**
Course Title	**:**	**Internet Concepts and Web Design (Lab Course)**
Assignment Number	**:**	**BCA(4)/L-016/Assignment/2021-22**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Dates for Submission	**:**	**31st October, 2021 (For July Session)** **15th April, 2022 (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.

Question 1: (70 Marks)

A Book publisher maintains a website of the books published by them. The publisher site displays the list of the book title, authors, date of publishing and price. In addition, it also displays a form for the authors who want to publish book. Design and create four web pages for the website of the Publisher namely, *Home, Book_List*, *Author_Registration*Form and *Feedback,* having the following features:

For consistency, every web page of the website should consist of three basic divisions –

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

Navigation - This division should be same for every web page. It should contain links to all the web pages, viz. *Home, Book_List*, *Author_Registration*Form and *Feedback.*

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

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

- *Home* page should include a Welcome message, information about the types of Books published by the publisher and contact details.
- *Book_List*page should display information about the bookspublished by the publisher, viz. title, authors, date of publishing and price.
- *Author_Registration*page should contain a form, which should have fields - name of the author, email id, phone, proposed book title, expected time to complete the book 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.

- *Feedback* page should display another form that has two input fields – Name of the person giving feedback and a text area for giving feedback; and a submit button.

Question 2: **(10 Marks)**

How does the use of CSS help in maintenance of the site created by you? Explain the important features of Angular JS.

Course Code	**:**	**BCSL-043**
Title	**:**	**Java Programming Lab**
Assignment Number	**:**	**BCA(4)/L-043/Assignment/2021-22**
Maximum Marks	**:**	**50**
Last date of Submission	**:**	**31st October, 2021 (for July Session)** **15th April, 2022 (for January Session)**

This assignment has two questions. Answer both the questions. These questions carry 40 marks. Rest 10 marks are for viva voce. Write Java program and take its output as part of solution. Please go through the guidelines regarding the assignments given in the programme guide for the format of presentation.

Question 1 (a):

Write a Java program to demonstrate us of all the arithmetic and logical operators in Java. **(10 Marks)**

Question 1 (b):

Write a Java program to create shape class as an abstract class, which is having abstract method area(). Derive classes circle and rectangle from shape class. Override area method in circle and rectangle class to find the area of the respective shape. Define appropriate constructors in circle and rectangle classes. Make necessary assumptions id any. **(10 Marks)**

Question 2 (a):

Write a program in java to read the content from a text file and count the number of words in the file. **(10 Marks)**

Question 2 (b):

Write a program in Java to create an applet which takes a number as input and displays the table of it. Use appropriate layout and user interface in your program. **(10 Marks)**

Course Code	**:**	**BCSL-044**
Course Title	**:**	**Statistical Techniques Lab**
Assignment Number	**:**	**BCA(4)/L-044/Assignment/2021-22**
Maximum Marks	**:**	**50**
Weightage	**:**	**25%**
Last Dates for Submission	**:**	**31st October, 2021 (For July Session)** **15th April, 2022 (For January Session)**

There are six questions in this assignment, which carries 40 marks. Rest 10 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.

Question 1: Height of the students of a class of 40 students was recorded. This data is given in the following table. Perform the tasks given in (i) to (iv) on the data given below using a spreadsheet package: **(6 Marks)**

(Height in Cms)

145	157	160	159	142	128	167	133	170	129
120	165	137	142	141	153	149	167	136	150
152	144	130	170	158	144	136	139	125	196
147	153	152	147	139	128	151	141	161	143

(i) Find the minimum and maximum height using the spreadsheet formula.
(ii) Create 6 classes with suitable class intervals and create the frequency distribution. You must use Array formula.
(iii) Find the percentage of the students whose height is less than the mean height. Also find outlier in the data, if any.
(iv) Draw the histogram for the data given in the table above. Is the data distribution normal distribution?

Question 2: Perform the following tasks using spreadsheet software (you may use spreadsheet function for computing the value of **t**): **(6 Marks)**

(i) Find the value of **t** for the given value of degree of freedom and significance level (alpha):

Degree of freedom	Significance
24	0.10
10	0.05

(ii) A company manufactures flour packets of 5 kg weight. A sample of 20 such flour packets were taken out of a lot consisting of 500 flour packets. The mean sample weight was found to be 5.150 kg having a standard deviation of 0.215 kg. Assuming random sampling and a confidence level of 95%, will you accept the flour packets. Justify your answer. You should perform all computations using a spreadsheet software. Make suitable assumption, if any.

Question 3: A hardware company produces IC chips; the length of each chip is required to be exactly 50 mm. The company has four different machines to produce these IC chips. Each day five samples of each machine are taken and the length of these IC chips is measured. The following tables lists these details: **(10 Marks)**

The length of IC chips (in mm)

Sample	Machine Identifier			
	A	B	C	D
1	50.12	50.15	50.13	50.00
2	49.95	49.99	50.01	50.11
3	50.02	49.97	49.91	49.92
4	50.13	50.16	49.99	50.02
5	50.07	49.90	50.11	50.10

Perform an ANOVA using any software to test (at 5% level) whether all the four machines are producing the IC chips with correct length. Justify your findings. Make suitable assumptions, if any.

Question 4: The rainfall in the first 15 days of August, 2021 is shown in the following table. Use spreadsheet software to find the moving averages for the length of 5 and 7. Also draw suitable graphs of these moving averages. **(6 Marks)**

Day	Rainfall (mm)
1	100
2	70
3	50
4	5
5	0
6	0
7	25
8	34
9	21
10	10
11	0
12	5
13	5
14	10
15	30

Question 5: A company packs nuts in a packet of 1 kg. The quality of process of producing the packets of nuts is controlled statistically. To do so, sample of five packets is taken at four different times of the day. Calculate the control limits for mean and range; and plot the control charts using any statistical software. Make suitable assumptions, if any. **(6 Marks)**

The data is given in the following table:

Sample id of the day	The weight of the packet of Nuts (in Kgs)				
1	1.052	1.025	0.995	0.999	1.008
2	1.093	1.002	0.998	1.001	1.009
3	1.044	1.011	1.001	1.050	1.060
4	1.055	1.014	1.030	1.037	0.991

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

Question 6: The following table shows the increase in the average salary of the employees of an organization. Fit a trend line using any statistical software to this sales data. Make suitable assumptions. **(6 Marks)**

Month	Jan	Feb	Mar	Apr	May	Jun	July
Salary	25000	21900	21950	22000	23000	24000	24500

Course Code	**:**	**BCSL-045**
Course Title	**:**	**Introduction to Algorithm design Lab**
Assignment Number	**:**	**BCA(4)/L-045/Assignment/2021-22**
Maximum Marks	**:**	**50**
Weightage	**:**	**25%**
Last date of Submission	**:**	**31st October, 2021 (For July Session)**
	:	**15th April, 2022 (For January Session)**

Note: Answer all the questions in the assignment having 40 marks in total. 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: **(i)** Implement the Bubble Sort algorithm for sorting the following list of numbers: **(9 Marks)**

35 18 28 7 45 9 11 8 5 3

(ii) Show all the intermediate results. Calculate the number of times the outer-loop, inner-loop and exchange operations will occur? **(6 Marks)**

Q2: **(i)** Implement the Merge sort algorithm to sort the following list of numbers recursively **(10 Marks)**

50 25 30 20 8 7 6 12 11 27

and show all the intermediate results.

(ii) Answer the following questions related to implementation: **(5 Marks)**

- How many times the inner-loop, outer-loop and copy operations will occur in the algorithm?

Q3: **(a)** Implement the binary search algorithm for the given sorted array with 14 elements to search for the numbers 55. **(6 Marks)**

3 5 8 10 15 20 25 28 5 40 45 47 50 55

Show all the intermediate results.

(b) Answer the following questions related to the implementation of the program.

(i) How many times the mid value will be calculated? **(2 Marks)**

(ii) How many times while and else-if statement will run? **(2 Marks)**