

BACHELOR OF COMPUTER APPLICATIONS (BCA)

(Revised Syllabus)

BCA(Revised Syllabus)/ASSIGN/SEMESTER-IV

ASSIGNMENTS

(July - 2017 & January - 2018)

**(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
MAIDAN GARHI, NEW DELHI – 110 068**

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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/17-18**
Maximum Marks : **100**
Weightage : **25%**
Last Dates for Submission : **15th October, 2017 (For July 2017 Session)**
15th April, 2018 (For January 2018 Session)

Note: This assignment has sixteen questions of 80 marks (each section of a 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.

1. In a study on the Per capita Income for a particular year in a city, the following weekly observations were made.

Per Capita Income (Rs.) - (1K=1000)	14K-15K	15K-16K	16K-17K	17K-18K	18K-19K	19K-20K
Number of Weeks	5	10	20	9	6	2

Draw a histogram and a frequency polygon on the same scale

2. Do you find any correlation between ages and playing habits of the students, whose distribution according to age groups is given in the following table

Age of groups(Years)	15-16	16-17	17-18	18-19	19-20	20-21
Number of Students	200	270	340	360	400	300
Number of Regular players	150	152	170	180	180	120

3. Data are given below shows statistics viz. standard deviation & average marks secured by students, in the examination of subject A and B

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

Assuming the Coefficient of correlation between A and B = ± 0.66

Perform the following tasks:

- i) Determine the two equations of regression
 - ii) Calculate the expected marks in A corresponding to 75 marks obtained in B.
4. Calculate 2-sigma and 3-sigma upper and lower control limits for means of samples 4 and prepare a control chart for a drilling machine, which bores holes with a mean deviation of 0.5230 cm and a standard deviation of 0.0032 cm.

5. Construct 5- yearly moving averages from the following data

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

6. In 120 throws of a single dice, following distribution of faces (F_0) was observed.

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.

7. a) If X is a Poisson variate and $p(X = 3) > p(X = 2)$ then find the minimum value of mean.
 b) Ten individuals are chosen at random, from a normal population and their weights (in kg) are found to be
 63, 63, 66, 67, 68, 69, 70, 70, 71 and 71. In the light of this data set, test the claim that the mean weight in population is 66 kg at 5% level of significance.
8. From a population of 20,000 observations, a sample of 500 observations is selected. Calculate the standard error of sample mean if the population standard deviation equals 20.
9. A random sample of 700 units from a large consignment showed that 200 were damaged. Find 95% confidence interval for the proportion of damaged unit in the consignment.
10. Two floppies are selected at random without replacement from a box containing 7 good and 3 defective floppies. Let A be the event that the first floppy drawn is defective, and let B be the event that the second floppy drawn is defective.
 (i) Find the conditional probabilities $P(B/A)$ and $P(B/A^c)$
 (ii) Show that $P(B) = P(B/A) \cdot P(A) + P(B/A^c) \cdot P(A^c) = P(A)$.
 (iii) Where $A^c =$ complement of event A .
11. Two new types of fuel, 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.

Data on Extra Mileage

Ordinary fuel	1	2	2	1
Premium fuel	2	2	1	3
Super fuel	4	1	2	3

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

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

(iii) Assuming that the error variance is known and is equal to 1, obtain the 95 % confidence interval for the mean extra mileage of super.

12. The numbers of collaborations made by a company during the first half of 2016 are as given in the Table below.

Data on collaborations

Month	Jan	Feb	Mar	Apr	May	June
No. of collaborations	2	4	3	4	3	2

- i) Draw the graph and comment.
 - ii) Prepare the table of forecasts and errors by applying simple exponential smoothing for the data given in (i) (take the exponential smoothing constant as 0.1).
13. Study the case below and answer the respective questions.
Ticket of a game costs Rs. 500/- per person, the game comprises of an experiment where 3 coins are to be tossed once and for each tail the organizer claims to pay Rs. 200/- and for each head a sum of Rs. 100/- is to be paid.
- i) Prepare the probability distribution table
 - ii) What type of probability distribution it is
 - iii) Is it profitable to play the game, give justification on the basis of the analysis of probability distribution table.
14. Explain the following with the help of an example :
- | | |
|-----------------------------------|---------------------------------------------|
| (a) Goodness of fit test | (b) Test of Independence |
| (c) Criteria for a good estimator | (d) Time Series analysis and its categories |
| (e) t – distribution | (f) F – distribution |
| (g) CHI - SQUARE distribution | |
15. Differentiate between the following (*any two*) :
- (a) Linear systematic sampling & circular systematic sampling.
 - (b) Z - Test & T – Test
 - (c) Correlation and Regression
16. List the advantages and disadvantages of using a sampling approach instead of a census approach for studying the characteristics of data.. Explain *any two* of the following sampling approaches:
- (a) Cluster sampling
 - (b) Stratified sampling
 - (c) Systematic sampling

Course Code	:	MCS-024
Course Title	:	Object Oriented Technologies and Java Programming
Assignment Number	:	BCA(4)/024/Assignment/17-18
Assignment Marks	:	100
Maximum Marks	:	25%
Last Date of Submission	:	15th Oct, 2017 (for Jul-2017 batch)
	:	15th April, 2018(for Jan-2018 batch)

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.

1. (a) What is Object Oriented Programming? Explain concepts of object and class, with the help of example of each. *(6 Marks)*
- (b) What is information hiding? Explain its advantages. *(2 Marks)*
- (c) Explain why java is platform independent. *(2 Marks)*
2. (a) What are different data types in java? Explain briefly. *(5 Marks)*
- (b) Write a java program to create an Account class and define methods in it, to manage saving bank account. *(5 Marks)*
3. (a) Explain with an example, how array of objects are created in java. *(2 Marks)*
- (b) Write a java program to demonstrate handling of multidimensional array in java. *(2 Marks)*
- (c) Write a java program to create Date class with proper constructor, to create object containing date and time. Define a method to display current date and time. Make necessary assumptions required. *(6 Marks)*
4. (a) What is inheritance? How it provides flexibility in application development? Explain with the help of an example. *(4 Marks)*
- (b) Explain the need of package in Java. Explain accessibility rules for package. *(3 Marks)*
- (c) Explain concept of polymorphism with the help of example. *(3 Marks)*
5. (a) What is interface? How it is different from abstract class. *(2 Marks)*
- (b) What is an exception? Explain various causes of exceptions. Explain different types of exceptions. *(5 Marks)*

- (c) Explain the situations in which constructors are overloaded, with the help of example. *(3 Marks)*
6. (a) What is multithreading? Explain various applications where multithreading may be used. Also explain how threads are created in java. *(6 Marks)*
- (b) Create an Applet which take name and address of a student and convert it into upper case. *(4 Marks)*
7. (a) What is object serialization? Explain working of object serialization. *(3 Marks)*
- (b) Explain different stream classes in java. *(3 Marks)*
- (c) Explain StringBuffer class and its various methods. *(4 Marks)*
8. (a) What is proxy server? Explain URL class and its methods in java. *(3 Marks)*
- (b) Explain sending UDP Datagrams with the help of an example. *(3 Marks)*
- (c) What is servlet ? Explain GET and POST methods of servlet. *(4 Marks)*

Course Code	:	BCS-041
Course Title	:	Fundamentals of Computer Networks
Assignment Number	:	BCA(4)/041/Assignment/17-18
Maximum Marks	:	100
Weightage	:	25%
Last Dates for Submission	:	15th Oct, 2017 (for Jul-2017 batch)
	:	15th April, 2018(for Jan-2018 batch)

There are four questions in this assignment, which carries 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.

1. (a) Differentiate between Go Back-N ARQ with Selective Repeat ARQ. *(10 Marks)*
Also, explain the disadvantages of stop-and-wait- ARQ in comparison to Go Back-N ARQ protocol.
- (b) Describe the architecture of an ATM network. Also, differentiate *(10 Marks)*
between two types of connections: PVC and SVC used in ATM.
2. (a) Differentiate between switch and bridge? What are the advantages of *(7 Marks)*
separating an Ethernet LAN using a bridge? Explain.
- (b) Write the role of DNS resolver in the DNS system. Also, explain how *(7 Marks)*
does a DNS Resolver bootstrap the domain name lookup process?
- (c) What is SMTP? What are the two parts of addressing system in SMTP? *(6 Marks)*
Explain.
3. (a) Explain masking used in addressing with the help of a suitable example. *(6 Marks)*
Also, difference between boundary level masking and non-boundary level masking.
- (b) Classify the routing protocols based on different parameters. Why is *(8 Marks)*
adaptive routing superior to non adaptive routing? Explain.
- (c) Discuss the various types of encoding and modulation techniques used *(6 Marks)*
in Data communication.
4. (a) Differentiate between analog and digital transmission. Give examples *(2 Marks)*
of each.
- (b) List the requirements to connect two different networks (Ethernet and *(4 Marks)*
Token ring) in the lower layers?
- (c) Explain the limitations of distance vector routing algorithm. *(4 Marks)*
- (d) Explain the significance and use of different fields of TCP header and *(10 Marks)*
IP header with the help of neat diagrams.

Course Code	:	BCS-042
Course Title	:	Introduction to Algorithm design
Assignment Number	:	BCA(4)/042/Assignment/17-18
Maximum Marks	:	80
Weightage	:	25%
Last date of Submission	:	15th October, 2017 (For July 2017 Session)
	:	15th April, 2018 (For January 2018 Session)

Note: Answer all the questions which carry 80 marks. The rest 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.

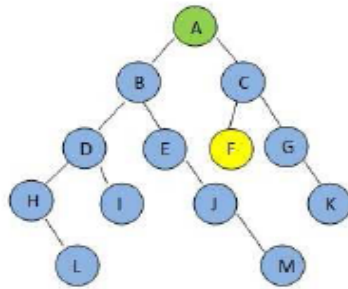
1. Use a big **O** notation to estimate the time required to calculate the Fibonacci series: 0 1 12 3 5 8 13 21 (3 Marks)
2. Apply Karatsuba' algorithm using Divide and Conquer method to multiply two numbers: 2106589 and 150658 (4 Marks)
3. Solve the following recurrence relations (15 Marks)
 - (i) $T(n) = 3T(n/2) + n$
 - (ii) $T(n) = 6T(n/2) + n^2$

using (a) Master Method (b) Recursion Tree Method and (c) Substitution Method
4. What are the three basic asymptotic notations? What for they are used? For the function defined by $f(n) = 6n^3 + 5n + 5$, show that $f(n) = O(n^3)$ (4 Marks)
5. Evaluate $P(x) = 5x^5 + 3x^4 + 4x^3 - 5x^2 + 6x - 7$ using Horn' rule. Show stepwise solutions. (4 Marks)
6. Apply Insertion sort algorithm to the following data set, show step by step results and calculate the number of comparisons and exchange operations needed to do the sorting operation (10 Marks)

24	7	12	14	9	70	4	50	5	60
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Also implement the algorithm in C-programming language.

7. Write pseudocode for left to right binary exponentiation evaluation. Apply the algorithm for evaluating a^{280} and show a step by step result. (10 Marks)
8. (i) Write few applications of BFS and DFS. Write BFS and DFS sequences of the following graph: (10 Marks)



(ii) Write DFS algorithm and do the complexity analysis of the algorithm.

9. Explain the following terms:

(10 Marks)

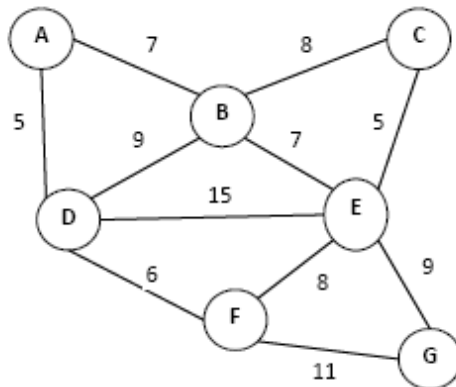
- Connected Graph
- Optimization Problem
- Triangle Inequality
- Recurrence Relation
- Mathematical Induction

10. (i) Write two applications of a spanning tree.

(10 Marks)

(ii) 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

(iii) Do analysis of the algorithm



Course Code	:	MCSL-016
Course Title	:	Internet Concepts and Web Design (Lab Course)
Assignment Number	:	BCA(4)/L-016/Assignment/17-18
Maximum Marks	:	100
Weightage	:	25%
Last Dates for Submission	:	15th October, 2017 (For July 2017 Session)
	:	15th April, 2018 (For January 2018 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.

1. IGBooks is a publishing company which publishes and sells its books through a network of resellers. The company has a website that provides the list of published books and the list of reseller who has the stock of the books. The books can also be sold online and despatched to the address of registered buyers. The website provides all the details of the books including authors, abstract, price, availability etc. Create a web site for this company having the following features: *(70 Marks)*

For the sake of consistency every page of the website should consists of four basic divisions –

Top – This division should be of fixed size and should display publisher name and logo. This division should be in different background colour. This division should be at the top of every page.

Bottom - This division contains the name of maintenance agency of the website and copyright information. This division should be at the bottom of every page.

Info - The pages that you are designing should differ in this Division only. The five different pages that you need to design are - Home, Books, Purchase, Status of purchase and Feedback.

Links - This division should be towards the left in every web page and should contain links to all the five web pages viz. Home, Books, Purchase, Status of purchase and Feedback.

The Info division of the five different pages should be as under:

- *Home* page should include Welcome message, the most popular books, most popular author etc.

- *Books* page shows the Category-wise list of various Books, their authors, abstract of the book and price of the book. This list should be displayed using table.
- *Purchase* page should show a HTML form that should ask for username and password. You may use JavaScript to verify that username and password are BCAMCA and TestPwd.
- *Status of purchase* page should display the list of all the past online orders that has been received by the publishers. This information should be displayed for at least two books.
- *Feedback* page should contain a form which should have fields - name, last book purchased, contact email, feedback on the book. You must use JavaScript to check that all the fields are filled by the person giving the feedback.

2. List any two latest web development technologies. List five important (10 Marks) features of each of these technologies.

Course Code	:	BCSL-043
Title	:	Java Programming Lab
Assignment Number	:	BCA(4)/L-043/Assignment/17-18
Maximum Marks	:	50
Weightage	:	25%
Last date of Submission	:	15th October, 2017 (For July 2017 Session)
	:	15th April, 2018 (For January 2018 Session)

Note: This assignment has three 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 java program. Please go through the guidelines regarding the assignments given in the programme guide for the format of presentation.

1. Write and execute java program which create a Factorial class. Define proper constructor and method(s) to find factorial of a given number. *(5 Marks)*
2. Write a program in Java for exception handling for operating a Queue data structure. Throw appropriate exceptions in different cases (such as queue is full and attempt is made to insert data in it etc.) *(10 Marks)*
3. Write a program in Java to create an applet which work as a simple calculator. *(25 Marks)*

Course Code : **BCSL-044**
Course Title : **Statistical Techniques Lab**
Assignment Number : **BCA(4)/L-044/Assignment/17-18**
Maximum Marks : **50**
Weightage : **25%**
Last Dates for Submission : **15th October, 2017 (For July 2017 Session)**
: **15th April, 2018 (For January 2018 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.

1. A LED light producer tested the life of 30 samples. 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)*

LED light life (in hrs)

38005	40000	35093	33985	24987	34899	44955	34888	33908	34098
27890	23009	34098	45008	45898	24898	30002	34526	41000	23989
34567	23456	43211	54123	12584	36547	14569	321458	25478	36541
41258	25478	26987	35896	39851	48015	41101	37097	41203	15874
31000	24584	41023	36214	39201	37258	34589	27015	29654	28622

- (i) Find the minimum and maximum LED light life using spreadsheet formula.
 - (ii) Create 10 classes with suitable class intervals and create the frequency distribution. You must use Array formula.
 - (iii) Find the percentage of LED lights which have less than mean life.
 - (iv) Draw the histogram for the data above. Also try to relate it to normal distribution curve.
2. 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): *(6 Marks)*
 - (i) Find the value of t for the give value of degree of freedom and significance level (alpha):

Degree of freedom	alpha value
12	0.05
10	0.01

(ii) A company manufactures a type of USB ports which should be 12 mm wide. A sample of 200 such USB ports were taken out of a lot consisting of 50000 ports. The mean sample width was found to be 11.95 mm having a standard deviation of 0.11 mm. Assuming a confidence level of 95%, will you accept the USB lot. Justify your answer. Make suitable assumption, if any.

3. A hypothetical petrol pump is equipped with a test measure of 2 litres. A (10 Marks) person can use this measure to verify, if s/he has got the right quantity of petrol. It has four filling machine namely A, B, C and D. Every day four samples are taken from every filling machine. The findings are given in the following table:

Data of filling machines while measuring 2 litres (in litres)

Sample	Manufacturer			
	A	B	C	D
1	2.01	1.89	2.11	1.95
2	2.02	1.87	2.01	1.93
3	1.99	2.02	2.09	1.89
4	1.98	1.97	2.01	2.00

Perform an ANOVA using any software to test (at 5% level) whether all the four filling machines are giving correct amount of petrol. Make suitable assumptions, if any.

4. Rainfall of first 15 days of July is recorded in the following table. Use (6 Marks) spreadsheet software to find the moving averages for the length of 3 and 5.

Day	Rainfall (in mm)
1	15
2	25
3	1
4	0
5	10
6	19
7	30
8	2

9	5
10	22
11	6
12	5
13	4
14	16
15	45

5. A company packs flour in sealed packs of 10 kgs. It measures the weight of 5 bags randomly; this measurement is repeated five times in each 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 Days	The weight of the bag (kgs)				
1	10.050	9.990	10.175	10.089	10.005
2	10.205	10.045	10.099	9.999	9.975
3	10.153	10.001	10.500	9.979	9.898
4	9.990	9.997	10.050	10.069	10.075
5	10.973	11.045	11.025	11.022	10.999

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

6. An Umbrella manufacturing company records the sale of Umbrella units in different months as given in the following table. Fit a trend line using any statistical software to this sales data. Make suitable assumptions. (6 Marks)

Month	Mar	Apr	May	June	Jul	Aug	Sept
Sales of Umbrella (Units)	500	1000	3000	7000	5000	2000	400

Course Code : **BCSL-045**
Course Title : **Introduction to Algorithm design Lab**
Assignment Number : **BCA(4)/L-045/Assignment/17-18**
Maximum Marks : **50**
Weightage : **25%**
Last date of Submission : **15th October, 2017 (For July 2017 Session)**
: **15th April, 2018 (For January 2018 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.

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

27, 15, 12, 14 ,17, 9 ,11, 25, 5, 3

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

2. Implement Quick Sort algorithm to sort the following array

70	90	40	30	15	25	20	10	67	5
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and calculate number of comparisons and exchange operations in the program

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

“ ABCDEFGH”

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

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

4	7	12	24	29	30	40	50	55	60
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and calculate how many comparison and division operations will be required for searching the number.

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

