

BACHELOR OF COMPUTER APPLICATIONS (BCA)

(Revised Syllabus)

BCA(Revised Syllabus)/ASSIGN/SEMESTER-IV

ASSIGNMENTS

(July - 2019 & January - 2020)

**(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**

CONTENTS

Course Code	Assignment No.	Submission-Schedule		Page No.
		For July-December Session	For January-June Session	
BCS-040	BCA(4)/004/Assignment/19-20	15 th October, 2019	15 th April, 2020	3
MCS-024	BCA(4)/024/Assignment/19-20	15 th October, 2019	15 th April, 2020	7
BCS-041	BCA(4)/041/Assignment/19-20	15 th October, 2019	15 th April, 2020	9
BCS-042	BCA(4)/042/Assignment/19-20	15 th October, 2019	15 th April, 2020	10
MCSL-016	BCA(4)/L-016/Assignment/19-20	15 th October, 2019	15 th April, 2020	12
BCSL-043	BCA(4)/L-043/Assignment/19-20	15 th October, 2019	15 th April, 2020	14
BCSL-044	BCA(4)/L-044/Assignment/19-20	15 th October, 2019	15 th April, 2020	15
BCSL-045	BCA(4)/L-045/Assignment/19-20	15 th October, 2019	15 th April, 2020	18

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/2019-20**
Maximum Marks : **100**
Weightage : **25%**
Last Date of Submission : **15th October, 2019 (For July,2019 Session)**
15th April, 2020 (For January,2020 Session)

Note: This assignment has 16 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. A research was conducted to improve the safety plans in a factory. In this study, the accidental data of the factory for the last 50 weeks were compiled. These data are grouped into the frequency distribution as shown below:

Number of Accidents	Numbers of Weeks
0-5	8
5-10	22
10-15	10
15-20	8
20-25	2

Draw a histogram and calculate the average number of accidents per week.

Q2. A cricket ball manufacturing company wants to check the variation in the weight of the balls. For this, 25 samples each of size 4, are selected and the weight of each ball is measured (in grams). The sum of the sample average and the sum of

Sample ranges were found to be $\sum_{i=1}^{25} \bar{X}_i = 4010$
Grams and $\sum_{i=1}^{25} R_i = 72$ grams, respectively.

Compute the control limits for the \bar{X} and R-charts. It is given that $A_2 = 0.729$, $D_3 = 0$ and $D_4 = 2.282$.

Q3. An insurance company insured 1000 scooter drivers, 3000 car drivers and 6000 truck drivers. The probabilities that the scooter, car and truck drivers meet with an accident are 0.2, 0.04 and 0.25 respectively. One of the injured persons meets with an accident. What is the probability that he is a car drivers ?

Q4. A researcher would like to test whether there is any significant difference between the proportion of safety consciousness of men and women while driving a car. In a sample of 300 men, 130 said that they used seat belts. In a sample of 300 women, 90 said that they used seat belts. Test the claim that there is no significant difference between the proportion of safety consciousness of men and women while driving a car at 5% level of significance. (Given that $Z_{0.025} = 1.96$)

- Q5.** A company manufactures two types of bulbs, (A and B). The manager of the company tests a random sample of 50 bulbs of type A and 60 bulbs of type B and obtains the following information:

	Mean Life (in hours)	Standard Deviation (in hours)
Type A	1300	50
Type B	1200	60

Obtain 99% confidence interval for the difference of the average life of the two types of bulbs. (Given that $Z_{0.005} = 2.58$)

- Q6.** A washing machine company chooses a random sample of 10 motors received from one of the suppliers. It determines the length of life of each of the motors. The results (in thousands of hours) are as follows:

4.5, 5.0, 4.2, 4.8, 4.2, 5.1, 4.0, 4.2, 4.2, 4.5

Compute a point estimate of the mean length of life of the motors received from the supplier.

- Q7.** A steel rod is subjected to stress. The tensile strength of the rod at different values of the stress are recorded. Find a relation between the tensile strength and the stress. The data is given below:

Stress (kg):	10	9	7	8	11
Tensile strength:	6	3	2	4	5

Also predict the tensile strength at a stress of 5 kg.

- Q8.** A computer engineer identifies four ways that a certain job can be done. To determine how long it takes operators to do the job when each of these methods is used, the engineer asks four operators to do the job using the method A, another four operators to do the job using method B, and so on. Each operator's time (in seconds) is shown below:

A	B	C	D
19	18	21	22
17	16	20	23
22	15	19	21
20	14	19	20

Construct the relevant analysis of variance table and test the hypothesis that the average time of all operators are equal at 1% level of significance.

(Given that $F_{0.01, (3, 12)} = 5.95$)

- Q9.** The following contingency table presents the analysis of 300 persons according to hair colour and eye colour:

	Eye Colour			
Hair Colour		Blue	Gray	Brown
	Fair	30	10	40
	Brown	40	20	40
	Black	50	30	40

Test the hypothesis that there is an association between hair colour and eye colour at 5% level of significance.

(Given that $\chi_{0.05, 4}^2 = 9.49$)

Q10. Suppose an analyst studies three villages having population $N_1 = 50000$, $N_2 = 30000$ and $N_3 = 40000$, respectively. A stratified random sample is to be taken with a total sample size of $n = 500$. Determine the sample size to be selected from each village individually using the method of (i) proportional, and (ii) optimal allocation. From the previous survey, it is known that the standard deviations are $S_1 = 30$, $S_2 = 15$ and $S_3 = 20$.

Q11. A company wants to estimate, how its monthly costs are related to its monthly output rate. The data for a sample of nine months is tabulated below :

Out Put (Tons)	1	2	4	8	6	5	8	9	7
Cost (Lakhs)	2	3	4	7	6	5	8	8	6

Using the data given above, perform following tasks :

- Calculate the best linear regression line, where the monthly output is the dependent variable and monthly cost is the independent variable.
- Use the regression line to predict the company's monthly cost, if they decide to produce 4 tons per month.

Q12. The Probability that atleast one of the two Independent events occur is 0.5. Probability that 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 event occurs.

Q13. Marks of six students are tabulated below:

Name :	Raj	Anil	Amit	Om	Rita	Renu
Marks :	54	50	52	48	50	52

From the population, tabulated above, you are suppose to choose a sample of size two.

- Determine, how many samples of size two are possible
- Construct sampling distribution of means by taking samples of size 2 and organize the data.

Q14. Explain the following with the help of an example each:

- Goodness of fit test
- Criteria for a good estimator
- Test of Independence
- ANOVA

Q15. Compare the following

- a) Cluster sampling, Stratified sampling and Systematic sampling
- b) Parametric and Non-Parametric Tests

Q16. What are control charts briefly discuss the utility of control charts?

Course Code	:	MCS-024
Course Title	:	Object Oriented Technologies and Java Programming
Assignment Number	:	BCA (4)/024/Assignment/2019-20
Maximum Marks	:	100%
Last Date of Submission	:	15th October, 2019 (for July 2019 Session) 15th April, 2020 (for January 2020 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.

Q1.

- (a) Explain basic concepts of Object Oriented Programming? Explain how data hiding is achieved. (5)
- (b) Explain use of different types of operators available in java with the help of examples. (5)

Q2.

- (a) Explain how class is defined in java with the help of an example. Also explain what are the things which are kept inside a class. (2)
- (b) Write a java program to create an Account class and define constructors in it. Inherit Saving_Bank_Account class from Account class. Override constructors of Account class in Saving_Bank_Account class. Define appropriate methods to operate the accounts. Make necessary assumptions. (8)

Q3.

- (a) Explain use of static methods in java. (2)
- (b) Write a java program to add two matrices of 4X4 in java. (3)
- (c) Explain different types of inheritance that are supported by java with the help of examples. (5)

Q4.

- (a) Explain uses of final and super keywords in java with the help of examples. (4)
- (b) Explain the need of package in Java. Explain accessibility rules for packages. (3)
- (c) Explain advantages of polymorphism with the help of example. (3)

Q5.

- (a) What is interface? How it is different from abstract class? Explain. (2)
- (b) What is an exception? Explain various causes of exceptions. With the help of a program explain how exceptions are handled in java. (4)
- (c) What is multithreading? Explain how threads are created in java. Describe java thread model. (4)

Q6.

- (a) Explain various applications where multithreading may be used. Also explain how interthread communication takes place in java. (5)
- (b) Create an Applet to draw different shapes on the basis of input given by user. (5)

Q7.

- (a) What is object serialization? Explain working and use of object serialization. (3)
- (b) Explain different stream classes in java. Also write a java program to save the given data in a file. (5)
- (c) Explain difference between Srtng and StringBuffer classes. (2)

Q8.

- (a) What is proxy server? Explain URL class and its methods in java. (3)
- (b) Explain advantages of JDBC. (2)
- (c) What is Servlet ? Explain GET and POST methods of Servlet. (3)
- (d) Explain TCP/IP Sockets. (2)

Course Code : **BCS-041**
Course Title : **Fundamentals of Computer Networks**
Assignment Number : **BCA (4)/041/Assignment/2019-20**
Maximum Marks : **100**
Weightage : **25%**
Last Date of Submission : **15th October, 2019 (for July 2019 Session)**
15th April, 2020 (for January 2020 Session)

This assignment has two questions for a total of 80 marks. Answer both the questions. Rest 20 marks are for viva voce.

- Q1.** Assuming that all routers and hosts are working properly and that all software in both is free of all errors, is there any chance, however small, that a packet will be delivered to the wrong destination? **(40)**
- Q2.** Suppose that you want to send an MP3 file to a friend, but your friend's ISP limits the size of each incoming message to 1 MB and the MP3 file is 4 MB. Is there a way to handle this situation by using RFC 5322 and MIME? Are there any other ways. **(40)**

Course Code	:	BCS-042
Course Title	:	Introduction to Algorithm design
Assignment Number	:	BCA(4)/042/Assignment/2019-20
Maximum Marks	:	80
Weightage	:	25%
Last date of Submission	:	15 th October, 2019 (For July 2019 Session)
	:	15 th April, 2020 (For January 2020 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. There are three asymptotic notations to define the time complexity of an algorithm. Define these notations with the help of an example for each. (6)

Q2. What is the Master Theorem? What kind of the problems are solved through this theorem. Use Master Theorem to give the tight asymptotic bounds of the following recurrence relation. (6)

$$T(n) = 2T\left(\frac{n}{2}\right) + n^2$$

Q3. (a) What are the three methods for solving recurrence relations. (8)
Elaborate any two methods with the help of appropriate examples.

(b) Define and explain the recurrence relations for the following problems . (6)

- (i) Fibonacci series.
- (ii) Merge Sort.

Q4. Write Insertion Sort algorithm to sort the following list of integer numbers. Show all the intermediate steps. (6)

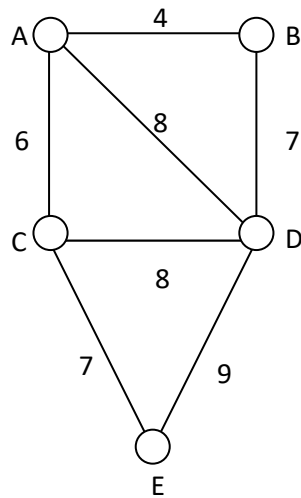
85	55	87	21	98	5	8	15	36	4
----	----	----	----	----	---	---	----	----	---

Also compute the worst case time complexity of the algorithm.

Q5. Write a program an algorithm to find a minimum of 10 integer numbers stored in an array and calculate the total number of comparison operations and how many times the loop will execute in the program? (6)

Q6. Write pseudocode to compute a^n using right to left binary exponentiation algorithm and perform its complexity analysis. Apply the algorithm to compute a^{33} and show all the intermediate steps. (5)

- Q7.** Define minimum cost spanning tree (MCST)? What are its applications? Write Kruskal's algorithm for constructing a MCST using Greedy approach and apply this algorithm to the following graph. (7)



Show all the intermediate steps.

- Q8** (a) Illustrate the operation of Merge Sort algorithm for the following array A (4)

42	84	15	60	25	10	35	70	75	5
----	----	----	----	----	----	----	----	----	---

- (b) Show how the recurrence for Merge Sort algorithm can be solved through the recurrence tree. (4)

- Q9.** Write all the three properties of shortest path and generic algorithm for solving a single source shortest path problem. (6)

- Q10.** Define an optimization problem. Write a generic algorithm for applying greedy technique to solve an optimization problem and apply it to solve the following problem: (10)

Consider a list of available currency notes in all denominations. Further it is assumed that currency notes of each denomination are available in sufficient numbers for the purpose of using minimum number of currency notes
 $C = \{1,2,5,10,50,100,500\}$

What should be the minimum number of notes to collect 999. Show all the intermediate steps

- Q11.** Define the following techniques. What kinds of problems are solved through these techniques? Discuss. (6)

- (i) Branch & Bound
- (ii) Dynamic Programming

Course Code	:	MCSL-016
Course Title	:	Internet Concepts and Web Design (Lab Course)
Assignment Number	:	BCA(4)/016/Assignment/2019-20
Maximum Marks	:	100
Weightage	:	25%
Last Dates for Submission	:	15th October, 2019 (For July 2019 Session)
	:	15th April, 2020 (For January 2020 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. (10+20+20+20=70)

An Online Examination company conducts examination for the registered students. At the beginning of each month, company announces the Examination Schedule of the month. This schedule includes date of examination, subject of examination, fee and venue of the examination. A student needs to register himself/herself for the examination of her/his choice. Create four web pages for the web site for this Online Examination Company having the following features:

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

Header – This division should be of fixed size and should display name and logo of the online Examination Company. This division should be in different background colour.

Footer - This division contains the name of developer of the website and copyright information, if any.

Content - The pages that you are designing should differ in this Division only. The four different pages that you need to design are - Home, Monthly Schedule, Syllabus and Registration.

Menu - This division should be towards the left in every web page and should contain links to all the web pages viz. Home, Monthly Schedule, Syllabus and Registration.

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

- *Home* page should include Welcome message, year of establishment of online examination company and brief details of the company.
- *Monthly Schedule* page should show the Schedule of the month. This schedule should include date of examination, subject of examination, fee and venue of the examination. You must make this list using Table tags.

- *Syllabus* page displays the syllabus of various examinations. The page should be linked to Subject of examination.
- *Registration* page should contain a form which should have fields - name of the student appearing in examination, his/her date of birth, and email Id. You must use JavaScript to check that all the fields are filled by the person registering for an online examination.

Q2.

(10)

List five important features of CSS and Angular JS.

Course Code : **BCSL-043**
Title : **Java Programming Lab**
Assignment Number : **BCA(4)/BCSL-043/Assignment/2019-20**
Maximum Marks : **50**
Last date of Submission : **15th October, 2019 (for July 2019 Session)**
15th April, 2020 (for January 2020 Session)

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.

Q1.

Write java program to find the factorial of a given number. Define appropriate class and methods in your program. **(10)**

Q2.

Write a program in java to read the content from a text file and count the number of words in the file. **(15)**

Q3.

Create an applet which take a number as input. If the number is between 11-90 and is an even number then display its table otherwise ask for other number as input. **(15)**

Course Code : **BCSL044**
Course Title : **Statistical Techniques Lab**
Assignment Number : **BCA(4)/044/Assignment/2019-20**
Maximum Marks : **50**
Weightage : **25%**
Last Dates for Submission : **15th October, 2019 (for July 2019 Session)**
15th April, 2020 (for January 2020 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.

Q1. Height of students of a class having 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)**

(Height in cms)

147	158	157	169	146	146	172	178	161	168
146	156	152	175	148	148	179	170	156	173
169	173	176	179	169	163	173	154	165	159
170	175	152	177	155	174	151	147	161	174

- (i) Find the minimum and maximum height using spreadsheet formula.
- (ii) Create 8 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
- (iv) Draw the histogram for the data above. Also try to relate it to normal distribution curve.

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): **(6)**

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

Degree of freedom	Significance
20	0.01
12	0.05

- (ii) A company manufactures bearings of diameter of size 0.5 cm. A sample of 10 such bearings were taken out of a lot consisting of 1000 bearings. The mean sample width was found to be 0.5020 cm having a standard deviation of 0.0009 cm. Assuming random sampling and a confidence level of 95%, will you accept the bearings. Justify your answer. Make suitable assumption, if any.

- Q3.** A Pharmaceutical Company produces a medicine involving 10 mg of a chemical. The company has four different plants to produce this medicine. Each day five samples of each plant are taken and quantity of the chemical in them is determined. The following tables lists these details: **(10)**

The Quantity of desired Chemical (in mgs) in Medicine

Sample	Plant of the Company			
	A	B	C	D
1	10.01	9.98	9.99	10.09
2	10.10	9.94	9.95	10.04
3	10.03	9.97	9.99	10.05
4	10.02	9.93	9.96	10.08
5	10.04	9.95	9.97	10.02

Perform an ANOVA using any software to test (at 5% level) whether all the four plants are producing the medicine with correct amount of chemical. Justify your findings. Make suitable assumptions, if any.

- Q4.** Sales of a departmental store are calculated on daily basis. The following table lists the sales data for first 15 days of the September month. Use spreadsheet software to find the moving averages for the length of 3 and 5. Also draw suitable graphs of these moving averages. **(6)**

Day	Sales in Thousand Rupees
1	50
2	21
3	23
4	19
5	10
6	22
7	85
8	49
9	32
10	15
11	11
12	14
13	15
14	34
15	46

- Q5.** A company packs soap solutions in sealed bottle of 2 liters. The quality of process of producing the bottles is controlled statistically. To do so four different samples are taken at different time each day having 5 samples each. Calculate the control limits for mean and range, and plot the control charts using any statistical software. Make suitable assumptions, if any. **(6)**

The data is given in the following table:

Sample number of the day	The volume of soap (in liters)				
1	2.02	1.99	2.01	2.09	2.08
2	2.10	2.02	2.10	2.06	2.01
3	2.04	2.11	2.12	1.89	1.93
4	2.05	2.09	2.08	1.92	2.13

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

Q6.

An Ice cream vendor records the sale of Icecream 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)

Month	Jan	Feb	Mar	Apr	May	Jun	July
Sales of Ice Cream (in Rupees)	100	200	300	500	800	900	800

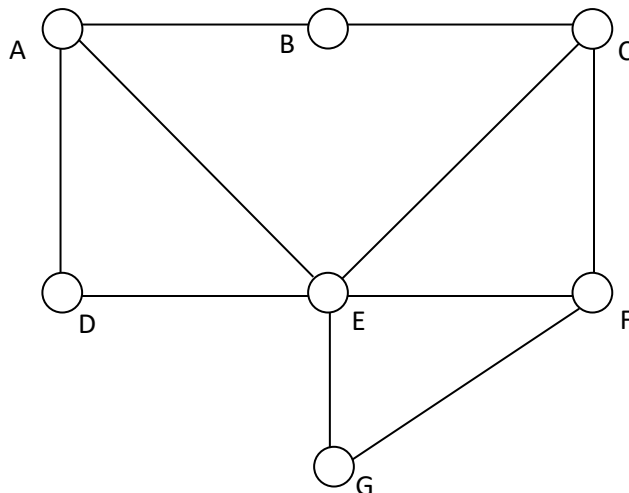
Course Code : **BCSL-045**
Course Title : **Introduction to Algorithm design Lab**
Assignment Number : **BCA(4)/L-045/Assignment/2019-20**
Maximum Marks : **50**
Weightage : **25%**
Last date of Submission : **15th October, 2019 (For July 2019 Session)**
: **15th April, 2020 (For January 2020 Session)**

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.

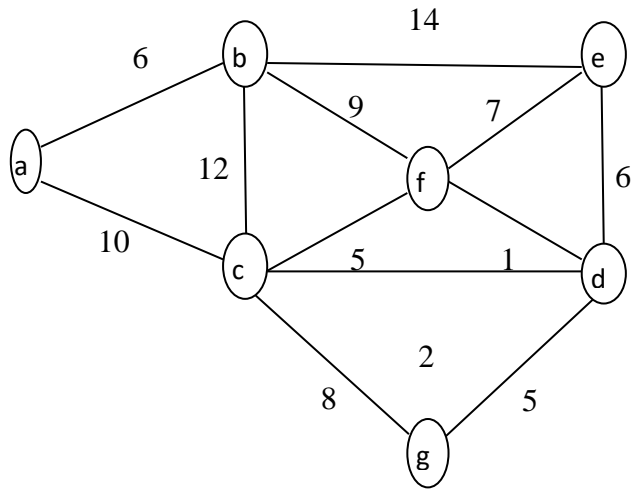
- Q1.** Write a program to compute X^n , where both X and n are integer numbers using left to right binary exponentiation algorithm. (5)
- Q2.** Write a program to find the largest number in the five array using **linear search algorithm**. Calculate the total no of comparison operations and the number of times the loop will execute. (5)

85	45	70	30	25	35	40	5	10	17
----	----	----	----	----	----	----	---	----	----

- Q3.** Write a program to traverse a graph using BFS. Apply this algorithm to the following graph and write the sequence of vertices to be travelled. Also calculate the number of times the loop(s) will execute. (7)



- Q4.** Implement GCD (Greatest common divisor) problem using Euclid’s algorithm. Apply this algorithm to find the output of GCD of 225 and 15. Also calculate how many times the mod and equal operations will execute. (5)
- Q5.** Implement and apply Kruskal’s algorithm to find a minimum cost spanning tree and test the result for the following graph: (7)



- Q6.** Implement Karatsuba's method using Divide & Conquer method to multiply two integer numbers. Test the result in multiplication of the following numbers and count the number of multiplication operations.
 $532680 * 43286$ (5)
- Q7.** Draw a complete graph with 6 vertices. Write a C-Program to represent the graph using adjacency matrix and adjacency list. (6)