

# **BACHELOR IN COMPUTER APPLICATION**

**(BCA)**

**(Revised Syllabus)**

BCA(Revised Syllabus)/ASSIGN/SEMESTER-IV

**ASSIGNMENTS**

**(July - 2018 & January - 2019)**

**(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/2018-19**  
**Maximum Marks** : **100**  
**Weightage** : **25%**  
**Last Date of Submission** : **15<sup>th</sup> October, 2018 (For July, 2018 Session)**  
**15<sup>th</sup> April, 2019 (For January, 2019 Session)**

**Note: This assignment has 10 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.**

**Question 1:** Given the following sample of 20 numbers: (10 marks)

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

- Compute mean, variance and standard deviation.
- 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.

**Question 2:** 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  $\frac{3}{25}$ . Also the probability that the second event occurs but not the first is  $\frac{8}{25}$ .” Find the probability that none of the two events occurs. (10 marks)

**Question 3:** 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? (10 marks)

**Question 4:** 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)

**Question 5:** 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

- (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.

**Question 6:** Following data are given for marks in subject A and B in a certain examination : (10 marks)

	SUBJECT A	SUBJECT B
<b>MEAN MARKS</b>	36	85
<b>STANDARD DEVIATION</b>	11	8

Coefficient of correlation between A and B =  $\pm 0.66$

- i) Determine the two equations of regression
- ii) Calculate the expected marks in A corresponding to 75 marks obtained in B.

**Question 7:** A drilling machine bores holes with a mean deviation of 0.5230 cm and a standard deviation of 0.0032 cm. Calculate 2-sigma and 3-sigma upper and lower control limits for means of samples 4 and prepare a control chart. (10 marks)

**Question 8:** 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

**Question 9:** 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 <sub>0</sub>	30	25	18	10	22	15	120

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

**Question 10:** Explain the following.

(10 marks)

- (a) t – Test
- (b) CHI - SQUARE distribution
- (c) Linear systematic sampling
- (d) Circular systematic sampling
- (j) Regression analysis
- (e) Z-Test
- (f) Goodness of Fit Test
- (g) Time series Analysis
- (h) Forecasting
- (j) Correlation coefficient

**Course Code** : MCS-024  
**Course Title** : Object Oriented Technologies and Java Programming  
**Assignment Number** : BCA(4)/024/Assignment/2018-19  
**Assignment Marks** : 100  
**Maximum Marks** : 25%  
**Last Date of Submission:** 15<sup>th</sup> October, 2018 (For July, 2018 Session)  
15<sup>th</sup> April, 2019 (For January, 2019 Session)

**Note:** There are eight questions in this assignment which carried 80 marks. Rest 20 marks are for viva-voce. Answer all the questions. Also in your programs give appropriate comments to increase understandability. Please go through the guidelines regarding assignments given in the Program Guide for the format of presentation.

**Question 1:**

- (a) What is Object Oriented Programming? Explain advantages of Object Oriented Programming with the help of an example. (5 Marks)
- (b) Explain features of java programming language. (2 Marks)
- (c) Write a program to explain use of Relational and Boolean operators in java. (3 Marks)

**Question 2:**

- (a) Explain use of *super* and *final* keywords in java with the help of examples. (4 Marks)
- (b) Explain followings in context of java, with the help of examples. (6 Marks)
  - i. Class and Objects
  - ii. Message Passing
  - iii. Garbage collection

**Question 3:**

- (a) What is static method? Explain why main method in java is always static. (2 Marks)
- (b) What is inheritance? How inheritance is implemented in java? Create a class Book and define display method to display book information. Inherit Reference\_Book and Magazine classes from Book class and override display method of Book class in Reference\_Book and Magazine classes. Make necessary assumptions required. (5 Marks)
- (c) Explain the steps involved in creating a distributed application using Remote Method Invocation (RMI). (3 Marks)

**Question 4:**

- (a) What is polymorphism? Explain its advantages with the help of a program. (4 Marks)
- (b) What is constructor overloading? Explain advantage of constructor overloading with the help of an example. (3 Marks)
- (c) What is rule of accessibility? Explain different level of accessibility in java. (3 Marks)

**Question 5:**

- (a) What is abstract class? Explain situations in which abstract classes are used. (3Marks)
- (b) What is an exception? Explain how an exception is handled in Java. Create your own exception class to handle a situation when age of a person is given in negative. Make necessary assumptions. (4 Marks)
- (c) Explain how threads are created in java. Write a java program to display threads priority. (3 Marks)

**Question 6:**

- (a) What is I/O stream in java? Write a program in java to create a file and copy the content of an already existing file into it. (4 Marks)
- (b) Create an Applet program to display your brief profile with photograph. Make necessary assumptions and use appropriate GUI and layout in your program. (4Marks)
- (c) Differentiate between String and StringBuffer classes. Also write a program to reverse a given string. (2Marks)

**Question 7:**

- (a) What is need of layout manager? Explain different layouts available in java for GUI programming. (4 Marks)
- (b) Explain FilterInputStream and FilterOutputStream in detail. (4 Marks)
- (c) Explain File class and its methods. (2 Marks)

**Question 8:**

- (a) Explain UDP in context of java programming. (2 Marks)
- (b) Explain different ways of session handling. (3 Marks)
- (c) What is JDBC? Explain how select statements are executed and ResultSet are accessed in JDBC programming. (5 Marks)

<b>Course Code</b>	:	<b>BCS-041</b>
<b>Course Title</b>	:	<b>Fundamentals of Computer Network</b>
<b>Assignment Number</b>	:	<b>BCA(4)/Assignment/2018-19</b>
<b>Maximum Marks</b>	:	<b>100</b>
<b>Weightage</b>	:	<b>25%</b>
<b>Last Dates for Submission</b>	:	<b>15<sup>th</sup> October, 2018 (For July, 2018 Session)</b> <b>15<sup>th</sup> April, 2019 (For January, 2019 Session)</b>

**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. Answer to each part of the question should be confined to about 300 words.**

**Question 1:**

- (a) The datalink layers of Ethernet consists of LLC sublayer and MAC sublayer. Describe functions of these sub layers. (4 Marks)
- (b) Explain the advantages and disadvantages of any two types of guided media and two types of unguided media transfer in computer networks. (8 Marks)
- (c) Explain in detail, how communication is taking place starting from connection establishment, data transfer and connection termination in Circuit switching and in Packet switching. (8 Marks)

**Question 2:**

- (a) Explain in details about the access method and frame format used in Ethernet and token ring. Also, explain the CSMA/CD method of Ethernet. (10 Marks)
- (b) What are the three main elements of distance vector algorithms. Explain the distance vector routing algorithm. Also, Mention the limitations of distance vector routing algorithm. (10 Marks)

**Question 3:**

- (a) Explain the working of 3 bit sliding window protocol with suitable example. (10 Marks)
- (b) Why congestion control is an important activity of networking. Explain Leaky bucket and Token bucket algorithm. (10 Marks)

**Question 4:**

- (a) Explain the working of RSA algorithm with the help of an example. Explain each step of encryption and decryption. (10 Marks)
- (b) Explain the use of different fields of UDP and TCP header format. Also, draw a diagram to illustrate the header format of TCP and UDP. (10 Marks)

<b>Course Code</b>	<b>: BCS-042</b>
<b>Course Title</b>	<b>: Introduction to Algorithm design</b>
<b>Assignment Number</b>	<b>: BCA(4)/042/Assignment/ 2018-19</b>
<b>Maximum Marks</b>	<b>: 80</b>
<b>Weightage</b>	<b>: 25%</b>
<b>Last date of Submission</b>	<b>: 15<sup>th</sup> October, 2018 (For July, 2018 Session)</b>
	<b>: 15<sup>th</sup> April, 2019 (For January, 2019 Session)</b>

**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.**

**Question 1:** (a) Why do we study algorithm? (2 marks)

(b) Write summation formulae for arithmetic and geometric series. (3 marks)

**Question 2:** For the function defined by  $f(n) = 6n^3 + 4n^2 + 5$ ; show that (6 marks)

- (i)  $f(n) = O(n^3)$
- (ii)  $f(n) \neq O(n)$
- (iii)  $n^4 \neq O(f(n))$

**Question 3:** Write pseudocode for computing GCD(m,n) where  $m = 525$  and  $n = 125$  and calculate worst time complexity of the problem. (5 marks)

**Question 4:** (a) Define Tower of Hanoi problem as a recurrence relation problem and solve it through a recurrence tree. (6 marks)

(b) What is Master Method? Write all the three cases of Master Method to solve the following recurrence relation:  
 $T(n) = aT(n/b) + f(n)$  and explain. (6 marks)

**Question 5:** (a) Define what is an optimization problem? Give any two examples of optimization problems with proper explanations. (5 marks)

(b) Find the optimal solution to the fractional Knapsack problem using Greedy technique: (5 marks)

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:

$(W_1, W_2, W_3, W_4, W_5, W_6) = (5, 10, 12, 13, 15, 20)$

**Question 6:** (a) 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:

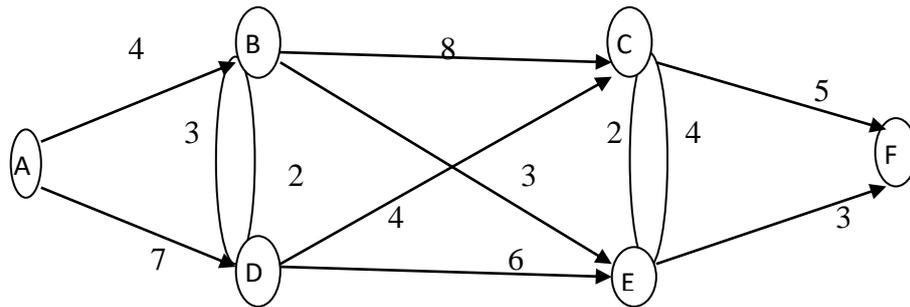


Figure-1

Show all the intermediate steps of the algorithm. (5 marks)

(b) Perform the analysis of the algorithm. (4 marks)

**Question 7:** (a) Illustrate the operation of a partition procedure of Quicksort algorithm for the following array. (5 marks)

22	44	30	50	15	5	25	15	35	10
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(b) Write the recurrence relation for the best case behavior of Quicksort algorithm and solve it through Master Method and recursion tree. (8 marks)

**Question 8:** (a) Perform the multiplication of the following two matrices A and B using Strassen's method:

5	10	15	20
0	8	9	4
12	14	0	7
14	6	7	11

Matrix A

11	4	13	0
16	0	17	3
2	6	0	8
15	14	2	3

Matrix B

Show all the intermediate steps. (5 marks)

(b) Perform overall time complexity of the algorithm. (5 marks)

**Question 9:** (a) Write an algorithm to search for the largest number in an array. Calculate its time complexity. (5 marks)

(b) Write Insertion Sort algorithm. Explain best case and worst case time complexity of the algorithm (5 marks)

<b>Course Code</b>	<b>:</b>	<b>MCSL-016</b>
<b>Course Title</b>	<b>:</b>	<b>Internet Concepts and Web Design (Lab Course)</b>
<b>Assignment Number</b>	<b>:</b>	<b>BCA(4)/016/Assignment/2018-19</b>
<b>Maximum Marks</b>	<b>:</b>	<b>100</b>
<b>Weightage</b>	<b>:</b>	<b>25%</b>
<b>Last Dates for Submission</b>	<b>:</b>	<b>15<sup>th</sup> October, 2018 (For July, 2018 Session) 15<sup>st</sup> April, 2019 (For January, 2019 Session)</b>

**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:** (20+10+10+10+20=70 Marks)

A company produces mobiles and sells them online. The mobiles are in various price ranges depending on its features. The mobiles are identified by a unique mobile ID and its Model number. The company also displays details like year of launch of a model and price of a mobile model. Buyers can register themselves on company website and buy different products online. Create four web pages for the web site for this mobile company having the following features:

For the sake of consistency every page of the website should consist of four basic divisions – (20 Marks)

- Header – This division should be of fixed size and should display mobile company name and logo. This division should be in different background colour.
- Footer - This division contains the name of maintenance agency 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, Mobile Model List, Detailed Specification of a mobile (just make one such page for one mobile model only) and Feedback.
- Menu - This division should be towards the left in every web page and should contain links to all the four web pages viz. Home, Mobile List Detailed specification, and Feedback.

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

- *Home* page should include Welcome message, Year of establishment of company and provide details of the three most popular models. (10 Marks)

- *Mobile Model List* page should show the list of various Mobile Models, its processor, its memory, year of launch, price and comments. You must make this list using Table tags. (10 Marks)
- *Detailed Specification* page displays screen size, resolution of camera, warranty etc. This page should be linked to Model number in the *Mobile Model List* page of to which these detailed specifications are given.(10 Marks)
- *Feedback* page should contain a form which should have fields - name of the prospective buyer, Model number of the model interested in, contact email id and feedback on the model, if any. You must use JavaScript to check that all the fields are filled by the person giving the feedback and model number is one of the models in the Mobile List. (20 Marks)

**Question 2:** (10 Marks)

List any two web development technologies that are used for creating dynamic web pages. List five important features of these technologies.

<b>Course Code</b>	<b>:</b>	<b>BCSL-043</b>
<b>Course Title</b>	<b>:</b>	<b>Java Programming Lab</b>
<b>Assignment Number</b>	<b>:</b>	<b>BCA(4)/BCSL-043/Assignment/2018-19</b>
<b>Maximum Marks</b>	<b>:</b>	<b>50</b>
<b>Weightage</b>	<b>:</b>	<b>25%</b>
<b>Last date of Submission</b>	<b>:</b>	<b>15<sup>th</sup> October, 2018 (For July, 2018 Session)</b> <b>15<sup>th</sup> April, 2019 (For January, 2019 Session)</b>

**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.**

**Question 1:**

Write and execute java program which create a Vehicle class and derive Car and Bus classes from Vehicle class. All the classes in your program should have proper constructors and methods to display vehicle details such as model, cost, mileage etc. Also use appropriate access specifiers in your program. (10 Marks)

**Question 2:**

Write a program in Java to copy the content from a text file to another text file. (15 Marks)

**Question 3:**

Write a program in Java to create an applet which generates the table of a given number between 1-10. If number entered is not in this range ask the user to input the number again and if input number is zero exit from the program. (15 Marks)

**Course Code** : **BCSL044**  
**Course Title** : **Statistical Techniques Lab**  
**Assignment Number** : **BCA(4)/044/Assignment/2018-19**  
**Maximum Marks** : **50**  
**Weightage** : **25%**  
**Last Dates for Submission** : **15<sup>th</sup> October, 2018 (For July, 2018 Session)**  
**15<sup>st</sup> April, 2019 (For January, 2019 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:** Weights and measures department measured the volume of 30 samples of the milk packets of 1 liter of XYZ milk company. 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)

**The Volume of Milk in 1 litre packet (in liters)**

1.002	0.995	0.999	1.005	0.989	1.025	1.050	0.979	1.030	0.992
1.011	1.095	1.009	1.055	1.071	0.985	0.930	1.009	0.967	0.987
1.021	0.956	1.000	0.965	0.977	1.019	1.010	0.999	1.010	0.975
1.001	1.017	0.961	1.043	0.980	1.017	1.023	0.939	1.000	0.932
1.013	0.995	0.999	1.005	0.989	1.011	0.959	1.029	1.822	0.923

- (i) Find the minimum and maximum volume of milk in 1 liter packing 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 packets whose milk volume is less than mean volume of milk in the packets.
- (iv) Draw the histogram for the data above. Also try to relate it to normal distribution curve.

**Question 2:** Perform the following tasks using a spreadsheet (you must either use 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 given value of degree of freedom and significance level (alpha):

Degree of freedom	Significance
30	0.05
15	0.10

- (ii) A company manufactures a Blank CDs having a thickness of 8 mm. A sample of 100 such CDs were taken out of a lot consisting of 10000 CDs. The mean sample width was found to be 8.024 mm having a standard deviation of 0.09 mm. Assuming a confidence level of 95%, will you accept the CDs. Justify your answer. Make suitable assumption, if any.

**Question 3:** A Company produces Weights of 5 Kgs. It has four machines that produces these weights namely machine A, B, C and D. Every day four samples from each machine are taken and tested against the standard weights and measure weighing scale. The findings are given in the following table: (10 Marks)

**Weights data**

Sample	Manufacturer			
	A	B	C	D
1	5.004	4.995	4.999	5.050
2	5.021	4.886	5.010	5.040
3	4.991	4.899	5.100	5.030
4	4.995	4.950	5.001	5.025

Perform an ANOVA using any software to test (at 5% level) whether all the four weighing scales are producing correct weights. Make suitable assumptions, if any.

**Question 4:** Water level in a supply tank is recorded every day before making a supply. The following are the reading of first 15 days of July. Use spreadsheet software to find the moving averages for the length of 4 and 6. (6 Marks)

Day	Water Level in meters
1	20.51
2	21.21
3	05.23
4	20.11
5	10.99
6	19.68
7	10.28
8	21.21
9	15.04
10	22.76
11	06.89
12	05.97
13	06.23
14	16.77
15	25.54

**Question 5:** A company packs Sugar in sealed packs of 5 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 Sugar bag (Kgs)				
1	5.023	4.999	5.512	4.876	5.028
2	4.893	5.021	5.016	5.011	5.088
3	4.824	5.111	5.121	4.895	4.933
4	4.785	5.097	5.222	5.069	5.123
5	4.888	5.045	5.068	4.921	4.989

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

**Question 6:** A Cotton cloth manufacturing company records the sale of its shirts 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	Jan	Feb	Mar	April	May	June	July
Sales of Shirts (Nos)	200	500	6000	8000	9000	9500	8000

**Course Code** : BCSL-045  
**Course Title** : Introduction to Algorithm design Lab  
**Assignment Number** : BCA(4)/L-045/Assignment/ 2018-19  
**Maximum Marks** : 50  
**Weightage** : 25%  
**Last date of Submission** : 15<sup>th</sup> October, 2018 (For July, 2018 Session)  
: 15<sup>th</sup> April, 2019 (For January, 2019 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.

**Question 1:** Consider a complete graph with five vertices. Write a C-program to store it by adjacency matrix and adjacency list. (5 marks)

**Question 2:** Implement Merge Sort algorithm recursively to sort the following array

85	45	70	30	25	35	40	5	10	17
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and calculate number of comparisons ,exchange operations and number of times the loops will execute in the program (5 marks)

**Question 3:** Write a program to concatenate the following two strings :

String1:“ABCDEFGH”

String2: “ JKLMN”

and calculate (i) Total number of comparison operations  
(ii) Total number of times the loop will execute (5 marks)

**Question 4:** Implement the Binary Search Algorithm to search for a number 50 in the following array . The array should be sorted using Bubble Sort in the ascending order. (5 marks)

80	75	32	44	50	60	65	70	27	14
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and calculate (i)how many comparison and division operations will be required for searching for the number and(ii) the number of times the outer loop will execute in Bubble Sort

**Question 5:** Apply Prim's algorithm to find a minimum cost spanning tree for the following graph: (10 marks)

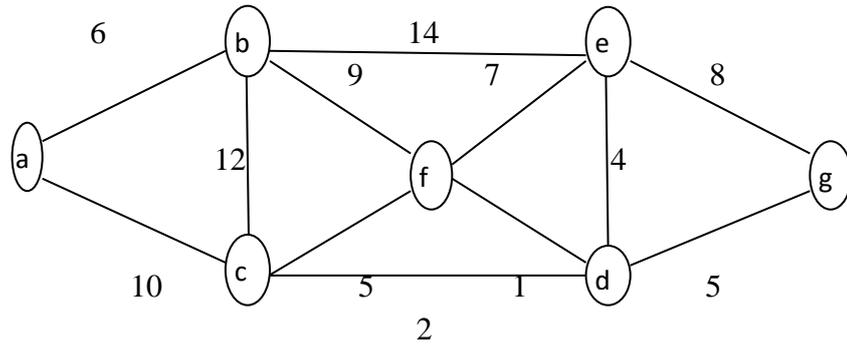
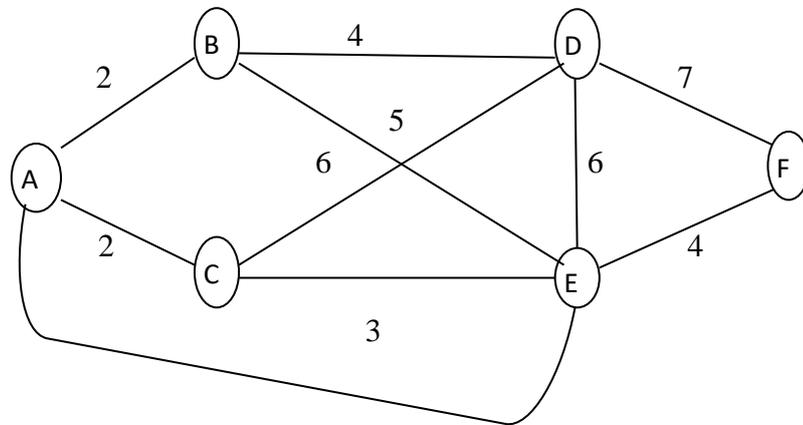


Figure-1

**Question 6:** Implement Dijkstra's algorithm to the following graph and find the shortest path from a node A to the remaining nodes (10 marks)



7  
Figure-2