BACHELOR OF COMPUTER APPLICATIONS

(BCA)

ASSIGNMENTS
(For July, 2014 and Jan., 2015 sessions)

(5th Semester (Revised Syllabus))

(BCS-051, BCS-052, BCS-053, BCS-054, BCS-055, BCSL-056, BCSL-057, BCSL-058)

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

CONTENTS

Course Code	:	**BCS-051**
Course Title	:	**Introduction to Software Engineering**
Assignment Number	:	**BCA(V)-051/Assign/14-15**
Maximum Marks	:	**100**
Weightage	:	**25%**
Last Date of Submission	:	**15th October, 2014 (For July 2014 Session)**
		15th April, 2015 (For January 2015 Session)

This assignment has three questions carrying a total of 80 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: (30 marks)

Develop SRS as per IEEE standard for any system of your choice.

Question 2: (30 marks)

Develop Design document for the system mentioned in Question 1.

Question 3: (20 marks)

Explain various certifications available to software development organizations which reflect on the processes they follow for the development of software.

Course Code   :   BCS-052
Course Title   :   **Network Programming and Administration**
Assignment Number   :   **BCA(V)-052/Assign/14-15**
Maximum Marks   :   **100**
Weightage   :   **25%**
Last Dates for Submission :   **15th October, 2014 (For July 2014 Session)**
                               15th April, 2015 (For January 2015 Session)

This assignment has 4 questions of 80 marks. Rest 20 marks are for viva voce.

Question 1:

(a) What is IPv6? Explain its need and important features those are not available in IPv4.

(6 Marks)

(b) Compare the sliding window protocol of data link layer and transport layer. Why flow control is used at both layers? Justify your answer.

(8 Marks)

(b) What are the corresponding protocols of the following TCP/IP protocols in the OSI Model? Compare them.
 - DNS
 - FTP
 - TFTP

(3 Marks)

(d) Why do LANs tend to use broadcast networks? Why not use networks consisting of multiplexers and switches.

(3 Marks)

Question 2:

(a) Why would an application use UDP instead of TCP? Also, explain how can TCP handle urgent data?

(6 Marks)

(b) Write a connection-oriented client and server program in C language on UNIX platform, where client program interact with the Server as given below:

   i   The client begins by sending a request; the server sends back a confirmation and its clock time to the client.
   ii   The client sends a number and server replies as the square of that number to the client.

(12 Marks)

(c)   What are the special IP addresses? Give the significance of these addresses.
(2 Marks)

Question 3:

(a)   What is HTTP? Describe the various HTTP request methods using an example of each.
(6 Marks)

(b)   What is domain name? How is a domain name translated to an equivalent IP address?
Explain using an example.   **(3 Marks)**

(c)   What is a mail server? Briefly explain specifying the protocols involved, how a sender
can send a mail to the server and the recipient retrieves it from the server?
(7 Marks)

(d)   Draw the IP datagram header format. "IP datagram has a checksum field still its called
unreliable protocol." Justify.
(4 Marks)

Question 4:

(a)   What are the NTFS, FAT, HPFS file systems? Compare and contrast between these file
systems.
(6 Marks)

(b)   Describe the activities to be performed at every layer in the TCP/IP model when
information flows from layer to another layer.
(8 Marks)

(c) Describe how to monitor the number of TCP connection failures in Linux and UNIX
(6 Marks)

Course Code	:	BCS-53
Course Title	:	**Web Programming**
Assignment Number	:	**BCA(V)-053Assign/14-15**
Maximum Marks	:	**100**
Weightage	:	**25%**
Last Date of Submission	:	**15ᵗʰ October, 2014 (For July 2014 Session)**
		15ᵗʰ April, 2015 (For January 2015 Session)

This assignment has two questions of 80 marks (each section of a question carries same 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. Please give precise answers. The word limit for each part is 300 words.

Question 1: (Covers Block 1)

a) How are Web 2.0 technologies different than that of Web 1.0? Explain the use of Mashups in web. Also explain any four new tags of HTML5.

(6 Marks)

b) Create a simple form that may be used for enrolling into IGNOU programmes. The form should have relevant drop down lists and other details. You must use CSS. Explain the advantages of using CSS.

(6 Marks)

c) Create a web page of your study centre. Create four sections in this webpage using <div> tags. Create two CSS files for the page and show how CSS can change the display format without affecting the content.

(6 Marks)

d) What are the uses of XML technology? Create at least five instances of your teachers data using XML. The list may contain name of teacher, her/his qualifications (starting from graduation degree) and date of joining the school. Each teacher should be assigned an ID as an attribute, and a phone number which should have residence or mobile as attribute. Also create the DTD for the XML document you have created. **(8 Marks)**

e) Explain the commands of JavaScript that can be used to modify a HTML Document. Explain how events are handled using JavaScript. Write a program using JavaScript that changes the text WELCOME to lower case and then again to upper case. This cycle of conversion is performed after every 10 seconds.

(8 Marks)

f) List 4 tags that are used in WML. Create a simple WML program which should include a text paragraph, a table, an image and any two WML input elements.

(6 Marks)

Question 2: (Covers Block 2) (10×4=40 Marks)

a) Differentiate between 2-tier and 3-tier architectures. Explain any two HTTP methods with the help of an example each. Also explain the concept of web container with the help of an example.

b) Explain the JSP life cycle with the help of a diagram. Explain the action elements of JSP with the help of an example each.

c) What is the need of a session in a JSP based website? Explain the URL rewriting, and use of Hidden Objects in the context of session management with the help of examples. List any two methods of session objects and explain each one of them with the help of an example each.

d) Explain the need of JDBC. In the question 1(b) you have created a simple form for enrolling into IGNOU programmes. Make necessary changes in this file such that it can be processed by a file named ignou.jsp. This ignou.jsp file should verify the data from the form and then should store it in a student admission database. You must design the suitable database for this purpose. Make suitable assumptions, if any.

Course Code	:	**BCS-054**
Course Title	:	**Computer Oriented Numerical Techniques**
Assignment Number	:	**BCA(V)-054/Assign/14-15**
Maximum Marks	:	**100**
Weightage	:	**25%**
Last Date of Submission	:	**15th October, 2014 (For July 2014 Session)**
		15th April, 2015 (For January 2015 Session)

Note: This assignment has questions of 80 marks (each section of a question carries same 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.

Illustrations/ examples, where-ever required, should be different from those given in the course material. Use of simple calculator is allowed

Q. No. 1:

(a) Explain each of the following concepts, along with at least one suitable example for each:
(i) normalized representation of a floating point number (ii) chopping error (iii) truncation error (iv) overflow (v) significant digits in a decimal representation

(5 Marks)

(b) Find out to how many decimal places the value $2+ (17/24)$ of e is accurate as an approximation of 2.71828182 where the value of e is caculated up to 8 places after decimal ?

(2 Marks)

(c) Explain with suitable examples that in computer arithmatics (i.e., numbers represented in computer, with $+, -, *, /$ as implemented in a computer)

    (i) $(a * (b * c)) = ((a * b) * c)$, i.e., associativity of *, may not be true for some computer numbers a, b and c
    (ii) $(a * (b + c)) = ((a* b) + (a * c))$, distributivity of + over *, may not be true for some computer numbers a, b and c **(4 Marks)**

(d) Obtain Approximate the value of $(1.4)^{-1,}$ using first three terms of Taylor's series expansion. **(3 Marks)**

(e) Calculate a bound for the truncation error in approximating $f(x) = \cos \mathbf{x}$ by
         $\cos (x) = 1 - x^2/ (\text{fact } 2) + x^4 / (\text{fact } 4) -- x^6/ (\text{fact } 6)$,
         where $-1 =< x =< 1$ and (fact n) denotes factorial of n **(3 Marks)**

Q. No. 2: (a) Solve the system of equations
         $x_1+ 2x_2+ 3X_3 = 14$
         $3x_1 + 3x_2 + 4x_3 = 21$
         $2x_1+ x_2 + 3x_3 = 13$
using Gauss elimination method with partial pivoting. **(4 Marks)**

(b)   Perform four iterations (rounded to four decimal places) using (i) Jacobi Method and (ii)   Gauss-Seidel method , for the following system of equations.

$$\begin{bmatrix} -8 & 1 & 1 \\ 1 & -5 & -1 \\ 1 & 1 & -4 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 3 \\ 12 \\ 9 \end{bmatrix}$$

With $\mathbf{x}^{(0)} = (0, 0, 0)^T$. The exact solution is $(-1, -2, -3)^T$. Which method gives better approximation to the exact solution?   **(3 Marks)**

Q. No. 3:

Determine the smallest roots of the following equation:
    $f(x) = x \sin(x) + \cos(x) = 0$
        to three significant digits using (i) Bisection method (ii) Secant method (iii) Newton Raphson method (iv) Regula-falsi method

                                                                                                (8 Marks)

Q. No. 4: (a) What is interpolation? Why do we need interpolation?
            (b) Show that $(E + 1)\delta = 2(E - 1)\mu$.
            (c) Express $\Delta^3 f_1$ as a backward difference.
            (d) Express $\Delta^3 f_1$ as a central difference.
            (e) Express $\delta^2 f_2$ as a forward difference.   **(10 Marks)**

Q. No. 5:

(a) By decinnial census, the population of a town was given below.

 Year (x)   : 1971 1981 1991 2001 2011
Population (y): **84**   97 **112**   **133**   **155** (in thousands)

    (i)   Using Newton's forward formula, estimate the population for the year 1975.
    (ii)   Using Newton's backward formula, estimate the population for the year 2005.
    (iii)   Using Stirling's central difference formula, estimate the population for the year 1994
                                                                                                (9 Marks)

(b) If values of the function f: x → y are given as $f(1) = -12$, $f(3) = 4$, $f(4) = 52$, $f(6) = 167$, find the Lagrange's interpolation polynomial of f(x). Also, find f(5)
                                                                                                (5 Marks)

9

Q. No. 6: Find the values of the first and second derivatives of f(x) at x = 82 from the
following table. Use $0(h^2)$ forward difference method. Also, find Truncation Error
(TE) and actual errors.

(5 Marks)

x :	82	86	90	94
f(x) :	6.2146	6.2344	6.2538	6.2729

Q. No. 7: Compute the value of the integral

$$\int_{4.7}^{6.7} (5e^x + 4 x^{28x} +) \ dx \quad \text{by}$$

(i) Rectangular Rule (ii) Trapezoidal Rule (iii) Simpson's 1/3 Rule   **(9 Marks)**

Q. No. 8:

(a) Solve the Initial Value Problem, using Euler's Method
$$y' = 2xy, \ y(0) = 0.5.$$
Find y(0.8) taking h = 0.2 and h = 0.1   **(4 Marks)**

(b) Solve the following Initial Value Problem using (i)R-K method of $0(h^2)$
(ii) R-K method of $0(h^4)$

$$y' = x^2 + y^2 \ \text{ and } y(0) = 1. \ \text{ Find } y(0.4) \text{ taking } h = 0.2, \ \text{ where } y' = \frac{dy}{dt}$$

(6 Marks)

Course Code	:	BCS-055
Course Title	:	Business Communication
Assignment Number	:	BCA(V)-055/Assign/14-15
Maximum Marks	:	100
Weightage	:	25%
Last Date of Submission	:	15ᵗʰ October, 2014 (For July 2014 Session)
		15ᵗʰ April, 2015 (For January 2015 Session)

This assignment has ten questions. Answer all questions. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation of assignment.

Q.1: Read the passage below and answer the questions that follow:

Scientists have theorized for decades that robots would make the perfect helper and companion. Now a handful of public schools in the US are putting that idea to the test.

This year, robots will be teaching everything from math to vocabulary to nutrition inside classrooms in California and New York, a move the researchers call a first in American Education.

The Los Angeles experiment, scheduled to start later this spring, will use a robotic "dragon" to teach first-graders about healthy lifestyle habits. Students will help show the robot how to prepare for a race; the hope is that by sharing tips with the dragon, they take their own lessons to heart.

Researchers see the classroom robots not as replacements for teachers but as whimsical assistants programmed to push kids' buttons. But some see the mechanization as the latest example of technology undermining the importance of human connections in the classroom.

The robot educators, most of which are small enough to perch on a table, don't replace teachers, exactly. Kids generally take turns with them in special sessions in a library or on the side of the classroom. The robots are programmed to mimic human behaviours: swiveling their heads when students speak, crying out when overeager kids get physical, and gesturing as they talk.

"How can you get the kids to do more math? They don't want to. But they do want to play with the robots," said Maja Matari, professor of computer science, neuroscience and pediatrics at USC, who is helping to lead the project in Los Angeles. Robots in the experiments are teaching and reinforcing lessons over several weeks, researchers say, even though it seems they are merely serving as electronic playmates.

The New York robot experiment relies on a basic insight: Children don't like admitting mistakes but they enjoy pointing out someone else's. The idea was to "use that to our advantage," said Sandra Okita, an assistant professor at Teachers College, Columbia Univeristy, who is leading the experiment.

She programmed her robot – a $14,000 android nicknamed "Projo," with glowing eyes, bulging triceps and a futuristic-looking white and orange spacesuit – to make carefully calculated errors when working with students. As the children correct their 2-foot-tall partner, she hopes they become more aware when they make the same mistakes.

"I think the imperfect robot is good for humans," Okita said, "It has to be a give-and-take relationship where you influence the robot and the robot influences you."

But some critics remain skeptical that robots could ever become true companions."It could be the greatest robot in the world, said Sherry Turkle, a professor at MIT. A robot teacher still won't understand what is going on in these human interactions.

In Los Angeles, some parents have bristled at the thought of robots supplanting teachers. "I don't think they'll take over the world but they may take all our jobs," laughed Victor Sanchez. Still, he counted the robots as an example of the school's innovations. "That's what we're promoting," Sanched said.

a)   Suggest a title for the passage. Give reasons why you think your title is appropriate.
(2)

b)   What is the main purpose of the Los Angeles experiment?
(2)

c)   Do you think such an experiment would actually "undermine the importance of human connection in the classroom"? Discuss.
(2)

d)   How can an "imperfect" robot help children correct their own mistakes?
(2)

e)   What is the criticism against robots in the classroom?
(2)

f)   Find words from the text which mean the same as following:
(5)

    i)   fantastic
    ii)   eroding
    iii)   imitate
    iv)   turning
    v)   adding new features

g)   Make sentences of your own with the following phrases. You make relevant changes to the phrase.
(5)

    i)   put an idea to the test
    ii)   call a first
    iii)   take their lessons to heart
    iv)   give-and-take relationship
    v)   bristled at the thought

Q.2:   Write short notes on the following: (10)
      i)   The role of small talk in business
      ii)   Difference between phone and walk-in-interview

Q.3:   As part of the recruitment process you have to participate in a Group Discussion. Prepare the proceedings of the GD which includes all the aspects of the discussion from the introduction to the conclusion. You may choose **any one** of the following topics.
                                                                                    (15)
      i)   Business enterprises (MNCs) venturing into education.
      ii)   FDI in Retail
      iii)   Social Media Censorship
      vi)   Young people must do voluntary work before entering the job market.

Q.4:   You visit a mobile store since you want to purchase a new smart phone. Write out the dialogue that you have with the sales person at the store.   (10)

Q.5:   You have been asked to write a presentation on what improvements can be made to increase productivity at your work place. Consider the development and use of people, materials, energy and machines.
                                                                                    (15)

Q.6:   Here are the answers to some questions. What are the questions?   (5)

  i) When ………………………………………….?
      I joined the company six years ago.
  ii) What ………………………………………….?
      I was an office assistant.
  iii) Which ………………………………………….?
      I worked in After-sales.
  iv) How long ………………………………………….?
      I worked in that department for 18 months.
  v) Where………………………………………….?
      It was just 6 kms from my home.

Q.7:   Complete these sentences with the correct comparative or superlative form of the adjectives in (brackets)
                                                                                    (5)
  i) IBM is one of the ……………………………..(big) computer companies in America.
  ii) A notebook computer is ……………………………..(expensive) than a desktop one.
  iii) I think a desktop computer is ……………………………..(good) than a Notebook.
  iv) In my opinion, telephone is the ……………………………..(important) piece of office equipment.
  v) The ……………………………..(fast) way to contact a client is by phone.

Q.8:   Fill in the blanks with *a/an, the*. Leave the blanks unfilled if *no article* is necessary.

(5)

Like doting parents, …………..robot researchers worry about …………..inner lives of their machines and how best to guide them through sticky social situations. Bullying by children has already been …………..problem. Researchers at …………..University of California, San Diego were horrified when toddlers learning vocabulary at the university's early Childhood Education Centre took only minutes to bash apart …………..robotic arm assembled over more than six months.

Q.9:   Read this telephone conversation and then complete with suitable words.   (10)
Assistant: Sales department. Good morning.
You: ……………………………………………………..
Assistant: Certainly. What exactly would like to know about our filing cabinets?
You: ……………………………………………………..
Assistant: They cost Rs. 9,000 each.
You: ……………………………………………………..
Assistant: I am sorry, but they're not available in black.
You: ……………………………………………………..
Assistant: We can deliver by the end of the week.
You: ……………………………………………………..
Assistant: You're welcome. Thank you for calling.

Q.10:   How would you introduce yourself in each of these situations given below?   (5)

i)   You meet a popular TV newsreader, in a party. Introduce yourself.
ii)   You meet an eminent scientist in a conference. Introduce yourself.

Course Code	:	**BCSL-056**
Title	:	**Network Programming and Administration Lab**
Assignment Number	:	**BCA(V)-056/Assign/14-15**
Maximum Marks	:	**50**
Weightage	:	**25%**
Last date of Submission	:	**15th October, 2014 (For July 2014 Session)**
		15th April, 2015 (For January 2015 Session)

Note: This assignment has two questions. Answer all the questions. These questions carry 40 marks. Rest 10 marks are for viva voce.

Question 1:

Write a UDP client and UDP server program in C language on UNIX operating system. A client program starts the communication and sends a text string. Whenever server is free, it can answer the client (however in case of multiple clients, server will respond on first come first serve basis) and send reverse of the text string sent by the respective client.

(20 Marks)

Question 2:

a) Write the step by step procedure to configure and launch an FTP server than install and test an FTP client in Linux.

(10 arks)

b) Write a step by step procedure to create and configure a remote server and transfer a Directory to Remote Server.

(10 Marks)

Course Code	:	**BCSL-057**
Course Title	:	**Web Programming Lab**
Assignment Number	:	**BCA(V)/057/Assign/14-15**
Maximum Marks	:	**50**
Weightage	:	**25%**
Last Dates for Submission	:	**15th October, 2014 (For July 2014 Session)**
		15th April, 2015 (For January 2015 Session)

This assignment has one question of 40 marks. Rest 10 marks are for viva voce. Please go through the guidelines regarding assignments given in the programme guide for the format of presentation.

Question 1:

Create a Sample site for your School having the following features (you must use CSS *preferably as a separate file*):

(a) The website should consists of four different areas - HEADER area, FOOTER area, MENU area and CONTENT area.

(b) All the pages of this web site should have common HEADER area consisting of the School Name with logo, and the mission of the school. You must use CSS to format this area.

(c) All the pages should have FOOTER area that must contain the copyright details of the website. It should contain the date and time of last update of the website as well as contact information of the school.

(d) The title of each page should be contain the school name.

(e) The MENU area of the website should contain a drop down menu consisting of following menu items:

> *Home, About School, School Faculty, Student Corner, Feedback*

Please note that the HEADER, MENU and FOOTER areas should be visible in all the web pages. Each menu item should be linked to a webpage.

(f) The CONTENT area of *Home* page should contain the information about the Objectives of the school and present events in the school. The events must be stored in a database and should be displayed from the database.

(g) The CONTENT area of *About School* page should contain the history of the school, school location on a map and how to reach directions. The history should be shown in a table form with alternative rows having different shading.

(h) The CONTENT area of the *School Faculty* page should contain names and qualifications of all the teachers of the school in a subject wise lists of primary, middle and senior teachers categories.

(i) The CONTENT area of *Student Corner* page should have a login page. The login account name and password must be verified from a database, and if found correct, student must be shown her/his marks. You must design suitable database for this.

(j) The *feedback* form should get the following information –

    a. Name of the person seeking information, the question and his/her email ID on which reply could be sent.

    b. You must check that all the fields of feedback form are duly filled up properly. Use JavaScript for this purpose.

    c. The feedback should be submitted and stored in a database.

Course Code : BCSL-058
Course Title : Computer Oriented Numerical Techniques Lab
Assignment Number : BCA(V)/058/Assign/14-15
Maximum Marks : 50
Weight age : 25%
Last Date of Submission : 30th September, 2014 (For July, 2014 session)
31st March, 2015 (For January, 2015 session)

This assignment has eight problems of 40 marks, each of 5 marks. All problems are compulsory. 10 marks are for viva voce.

Note: The programs are to be written in C/C++ and/or in MS-Excel/Any spread sheet.

Problem No. 1: Write a programme that generates (three) approximations of the sequence $\{x_n\} = \{1/3^n\}$, using the following three schemes (one for each approximation):

(a) $r_0 = 0.99996$ and $r_n = \dfrac{1}{5}(r_{n-1})$

for $n = 1, 2, \ldots\ldots$

(b) $p_0 = 1.0, p_1 = 0.33332$ and $p_n = \dfrac{6}{5}p_{n-1} - \dfrac{1}{5}p_{n-2}$

for $n = 2, 3, \ldots\ldots\ldots$

(c) $q_0 = 1.0, q_1 = 0.199997$ and $q_n = \dfrac{26}{5}q_{n-1} - q_{n-2}$

for $n = 2, 3, \ldots\ldots$

Further, make a table of errors for each of the three approximations in the following format for first ten errors (for each)

n	$\left|x_n - r_n\right|$	$\left|x_n - p_n\right|$	$\left|x_n - q_n\right|$
0			
1			
.			
.			
.			
10			

Problem No. 2: Write a programme that implements (non-pivoting) Gaussian elimination method for solving n linear equations in n variables, that calls procedures
(i)   lower-triangularisation and
(ii)   back substitutions
      (*codes of procedures are also to be written*).

Use the programme for solving the following system of linear equations:

$$x + 2y + 3z = 10$$
$$2x + y + z = 9$$
$$5x + 3y + 2z = 23$$

Problem No. 3: Write a programme that approximates a root of the equation $f(x) = 0$ in an interval [a, b] using **regula-falsi method**. The necessary assumptions for application of regula-falsi method should be explicitly mentioned. Use the method to find a root of the equation $x^2 - 8x + 15 = 0$.

Problem No. 4: Write a programme that approximates a root of the equation $f(x) = 0$ in interval [a, b] using **Gauss-Seidel method**. Use the method to solve the system of linear equations given in Q. No. 2 above. You may make assumption for appropriate initial values of the variable.

Problem No. 5: Write a programme that constructs Newton's Interpolating Polynomials, for which at most four nodes are given (hence interpolating polynomial will be at most cubic). Using the programme, find Newton's Interpolating polynomial that approximiates
$f(x)=2x^3-x+3$ and the nodes given are $x_0 = -1$, $x_1 = 0$, $x_2 = 1$ *and* $x_3 = 2$. Use the polynomial to approximate value at $x = 1.5$.

Problem No. 6: Repeat Problem No. 5 for constructing Lagrangian Polynomial instead of Newton's Polynomials.

Problem No.7: Write a programme that approximates the value of a definite integral $\int_z^b f(x)dx$

using Trapezoidal Rule, with m sample points. Find an approximate value of the integral of $f(x) = 3x^2(\cos 2\sqrt{x})$ over the interval [1, 6].

Problem No. 8: Write a program that solves Initial Value Problem (IVP) of order one: $y'(x)=dy/dx=f(x,y)$ with initial condition at $x=x_0$ as $y(x_0) = y_0$ using Improved Euler's Method. Using your program solve the IVP: $y' = dy/dx = x^2 + y^2 - 2$, $y(0)=1$. Compute upto 5 places of decimal.