BACHELOR OF COMPUTER APPLICATIONS (BCA)

(Revised Syllabus)

BCA(Revised Syllabus)/ASSIGN/SEMESTER-V

ASSIGNMENTS

(July - 2020 & January - 2021)

(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

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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-051**
Course Title	**:**	**Introduction to Software Engineering**
Assignment Number	**:**	**BCA(V)-051/Assign/2020-21**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Date of Submission	**:**	**31st October, 2020 (For July,2020 Session)** **15th April, 2021 (For January,2021 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.

Q1. Develop SRS as per IEEE standard for Library Information System. Make assumptions wherever necessary. **(30 marks)**

Q2. Develop Design Document for the System mentioned in Question no.1 **(30 marks)**

Q3. What is Change Management? Explain the process of changing requirements for a Softwareto be developed **(20 marks)**

Course Code	**:**	**BCS-052**
Course Title	**:**	**Network Programming and Administration**
Assignment Number	**:**	**BCA(5)/052/Assignment/2020-21**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Dates for Submission	**:**	**31st October, 2020 (For July,2020 Session)** **15th April, 2021 (For January,2021 Session)**

Answer all the questions of the assignment having 80 marks in total. 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.

Q1. **(a)** Define classful addressing and discuss problems associated with it. **(5 Marks)**

(b) Explain the concept of subnetting, default mask and subnet mask. **(3 Marks)**

(c) Calculate subnet address if the IP address and the subnet mask are given as shown below: **(4 Marks)**

IP address: 205.50.39.56
Subnet Mask: 255.255.245.0

Q2. **(a)** What is the address space in a system with 32 bit addresses? **(2 Marks)**

(b) How many bits are needed for defining Net IDs and Host IDs of Class A, Class B and Class C respectively? **(3 Marks)**

Q3. **(a)** Draw a TCP header diagram and show the number of bits required for each field. Which field indicates the length of the TCP header? Explain with an example. **(6 Marks)**

(b) What is the significance of the following TCP header fields: **(10 Marks)**

- Sequence Number
- Reserved bits
- Window Size
- Checksum
- Urgent Pointer

Q4. What is the role of DNS in Internet ? Explain the steps followed in the domain name resolution with the help of a diagram. **(5 Marks)**

Q5. **(a)** Write an algorithm for TCP client and a server programs using the following specifications and explain the libraries and commands used in the algorithm: **(8 Marks)**

- A TCP client establishes the connection.After the connection is established it sends an integer number to the server.
- A TCP server which can handle maximum four clients ,accept the numbers sent by the clients ,calculates whether the number sent by the clients is a prime number or not and finally sends the reply to the respective client.

(b) Discuss the standard socket types and its corresponding protocols. Explain using the proper syntaxes and examples , the system calls used by the client and a server to establish connections before data transfer. **(6 Marks)**

(c) What is the need for remote administration? Discuss the common services for which the remote administration is used.Discribe any three remote administration tools. **(8 Marks)**

Q6. Explain the commands being used in Linux environment for problem diagonosis and trouble shooting. **(8 Marks)**

Q7. Discuss the various disk management functions . What are the tasks followed for secure disk management? Elaborate. **(6 Marks)**

Q8. What is the main functions of the Dynamic Host Configuration Protocol? How does it work? Where is the DHCP server located? **(6 Marks)**

Course Code	**:**	**BCS-53**
Course Title	**:**	**Web Programming**
Assignment Number	**:**	**BCA (R5)-53/Assignment/2020-21**
Maximum Marks	**:**	**100**
Last Date of Submission	**:**	**31st October, 2020 (For July,2020 Session)** **15th April, 2021 (For January,2021 Session)**

This assignment has two questions 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. Please give precise answers. The word limit for each part is 300 words.

Q1: (Covers Block 1)

a) What is Web 2.0? How is it different to Web 3.0? What is the basic concept of Web 4.0? Explain the term WWW and its uses. Explain the term "Blogging". List any 10 protocols/software that can be used as Web 2.0 technologies. **(6 Marks)**

b) Create a registration form, using HTML for opening an email account with an organisation. The form asks for the following information:

- Proposed email id (it can be of the type xxxx@abc.in)
- Proposed password (should have a minimum size of 6 characters)
- Name of the person requesting for email account
- City and State of the person requesting for email account (both should be selected from drop down lists, default value for City should be **Jaipur** and State be **Rajasthan**)
- desired email services, which can be selected from "Basic Service" or "Advanced Service".
- The form should include a SUBMIT button.

You must also create a CSS file for this form. This CSS file should define font family; a font size of 16 points for headings, and font size of 12 points for normal text; font colour should be dark green for the headings and dark blue for normal text. The background colour of the form should be light grey. Also write the code using JavaScript that validates the data entered in the email id and password fields. Submit the HTML code, JavaScript code and display of form in a browser. You must demonstrate the form at the time of viva. **(8 Marks)**

c) Using table and lists create two web pages, first displaying the schedule of assignments that are to submitted by the students of BCA first year. This first web page should include the course code and course name of the courses of BCA first year for which assignments are to be submitted, the assignment number, the last date of submission of assignment and the date and time of viva-voce for the students. The second page should display an unordered list, displaying the suggestions for writing assignment responses. You should use tags, wherever needed, and create an internal CSS file, which formats the web pages as follows: (You must submit the HTML and CSS code and the display of pages in a browser)

(i) Table must have a proper heading. The content of the table headings should be in Bold.

(ii) The table heading should be shaded and every alternate row of table should have a light green as the fill colour. The background of the table should be light yellow.

(iii) The font of the unordered list should be "Times New Roman" with font size of 11 points.

(iv) You must demonstrate how changes in CSS can change the display at the time of Viva. **(6 Marks)**

d) A store maintains the list of its Customers using XML. Each Customer is assigned a unique Customer Identifier (CustID) of 6 digits. This CustID is used as an attribute in XML document. The document stores the customer name, customer address (at least one address is required), customer phones (at least one phone number is required) and customer profession (optional). Create an XML documents containing information of five such customers. Also create the DTD to verify the XML document created by you. **(8 Marks)**

e) Write and demonstrate (at the time of viva) JavaScript code that displays the message "Let us try JavaScript" and changes this text to "Write Programs using JavaScript" after some time. You may use event handling. Make suitable assumptions, if any. **(6 Marks)**

f) Discuss the WAP model. Explain the following WML elements with the help of an example

- <a> element
- Anchor element
- Select elements **(6 Marks)**

Q2: (Covers Block 2) **(10×4=40 Marks)**

a) Explain the following with the help of a diagram/example, if needed:

(i) MVC architecture

(ii) GET and POST methods

(iii) Server side scripting and its tools

(iv) Web Container

(v) N Tier architecture

b) Explain with the help of an example/diagram or write code for the following using JSP:
   a) The process of generating dynamic content using JSP and advantages of using JSP.
   b) page and include directives of JSP
   c) Declaration, expressions and scriptlets in the context of scripting elements
   d) <jsp:getProperty> and< jsp:setProperty> action elements
   e) session and out implicit objects

c) Write JSP programs which can perform the following tasks:

   (i) A page requires input of four variables a, b, c and d, it then computes and displays the value a*b/(c+d). In addition, the program must make sure that, in case there is division by zero error, it is reported. Write the JSP code for the above.

   (ii) Why are cookies created? Explain their use with the help of two cookies namely customerID and customername. The example should demonstrate the use of the cookie.

d) Explain the process of application development and deployment; and develop and deploy the following application using this process:

   Develop and deploy a "Staff Management System" for an organisation using JSP and any database backend. This system stores the following information about the staff members:

   A database table stores the basic information about the staff, which includes: StaffmemberID, Name, qualification, date of joining, address, phone and designation.

   A second table stores the information about designation and the fixed monthly salary for that designation (assume that salary is fixed)

   This system is used by the Human Resource Management team, which can enter information of a new staff member; or delete the data of a member who has left the organisation; or change the designation of a staff member; or computes the total salary to be paid for all the staff members. Submit the program and database for the given system. You must demonstrate this system at the time of viva.

   Make and state suitable assumptions.

Course Code	**:**	**BCS-054**
Course Title	**:**	**Computer Oriented Numerical Techniques**
Assignment Number	**:**	**BCA(V)/054/Assignment/2020-21**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Dates for Submission	**:**	**31st October, 2020 (For July,2020 Session)** **15th April, 2021 (For January,2021 Session)**

This assignment has eight questions of total 80 marks. Answer all the questions. 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. You must use only simple calculator to perform the calculations.

Q1:

(a) Use the eight-decimal digit floating point representation as given in your Block 1, Unit 1, Section 1.3.1 page 29 to perform the following operations: **(3 Marks)**

(i) Represent 0.000001235432 and 257890000012 as floating point numbers in normalised form using chopping for first number and rounding for second number.
(ii) What is the absolute and relative error in the representation of the two numbers given above?
(iii) Using the floating point representation, perform an addition of the two numbers given above. What is the error in the resulting number?
(iv) Using the floating point representation, multiply the first number and second number. Convert the result into normalized form in the given format.
(v) Take the first number as 0.00000000000003234 and assume any second number to demonstrate the concept of overflow or underflow for the given representation. (You may assume any second number to demonstrate overflow or underflow).
(vi) What is use of bias in binary floating point representation. Explain the concept of bias with the help of an example for binary floating point numbers.

(b) What is the meaning of the term "Subtractive Cancellation"? Explain with the help of an example. How is subtractive cancellation related to or different from an Unstable Algorithm? Explain with the help of an example. **(2 Marks)**

(c) Find the Maclaurin series for $f(x) = e^{2x}$ at x=0. Use first four terms of this series to compute the value of the function at any value of x. Also find the bounds of truncation error for such cases. **(3 Marks)**

(d) What is a truncation error? How can Taylor's series be used to determine truncation error? Explain with the help of an example. **(2 Marks)**

Q2:

(a) Solve the system of equations **(5 Marks)**

$$\begin{aligned} 2x + y + 5z &= 18 \\ 5x + 3y - 2z &= 2 \\ x - 6y + 2z &= 1 \end{aligned}$$

using Gauss elimination method with **partial pivoting**. Show all the steps.

(b) Perform four iterations (rounded to four decimal places) using **(5 Marks)**

(i) Jacobi Method and
(ii) Gauss-Seidel method
for the following system of equations.

$$\begin{bmatrix} 6 & 4 & -1 \\ 4 & -8 & 3 \\ -3 & 2 & 5 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 25 \\ -1 \\ 0 \end{bmatrix}$$

With $\mathbf{x}^{(0)} = (0, 0, 0)^T$. The exact solution is $(3, 2, 1)^T$.

Which method gives better approximation to the exact solution?

Q3:

Determine the smallest positive root of the following equation: **(10 Marks)**

$$f(x) = 3x^4 - 5x^2 - 11x - 13 = 0$$

The root should be correct up to 2 decimal places, using

(a) Regula-falsi method (b) Newton-Raphson method (c) Bisection method
(d) Secant method

Q4:

(a) Find Lagrange's interpolating polynomial that fits the following data. Hence obtain the value of f(4). **(5 Marks)**

x	1	3	6	10
f(x)	1	5	26	82

(b) Using the Lagrange's inverse interpolation method, find the value of x when y is 7. **(5 Marks)**

x	6	20	42	90
y=f(x)	1	3	5	8

Q5:

(a) The depositions in a Bank for 5 different years are given in the following table: **(3+2+3 = 8 Marks)**

Year (x)	2011	2013	2015	2017	2019
Deposits(y) (Crores (INR))	5	15	45	102	193

(i) Using Stirling's central difference formula estimate the deposits for the year 2014

(ii) Using Newton's forward formula estimate the deposits for the year 2012.

(iii) Using Newton's backward formula estimate the deposits for the year 2018.

(b) Derive an expression of forward difference operator in terms of δ. **(2 Marks)**

Q6:

(a) Find the values of the first and second derivatives of $y = 2x^2+3x-2$ for x=1.25 using the following table. Use forward difference method. Also, find Truncation Error (TE) and actual errors. **(5 Marks)**

x	:	1	1.5	2	2.5
y	:	3	7	12	18

(b) Find the values of the first and second derivatives of $y = 2x^2+3x-2$ for x=1.25 from the following table using Lagrange's interpolation formula. Compare the results with (a) part above. **(5 Marks)**

x	:	1	1.5	2	2.5
y	:	3	7	12	18

Q7:

Compute the value of the integral **(10 Marks)**

$$\int_0^6 (2x^4 + 3x^3 - 11x^2)\, dx$$

By taking 12 equal subintervals using (a) Trapezoidal Rule and then (b) Simpson's 1/3 Rule. Compare the result with the actual value.

Q8:

(a) Solve the Initial Value Problem, using Euler's Method for the differential Equation: **(4 Marks)**

$y' = 1+3xy$, given that $y(0) = 1$.

Find $y(1.0)$ taking (i) $h = 0.25$ and then (ii) $h = 0.5$

(b) Solve the following Initial Value Problem using (i)R-K method of $O(h^2)$ and (ii) R-K method of $O(h^4)$ **(6 Marks)**

$y' = x^2y + x^2$ and $y(0) = 1$.

Find $y(0.4)$ taking $h = 0.2$, where y' means dy/dx

Course Code	**:**	**BCS-055**
Course Title	**:**	**Business Communication**
Assignment Number	**:**	**BCA(V)/055/Assignment/2020-21**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last date of submission	**:**	**31st October, 2020 (For July,2020 Session)** **15th April, 2021 (For January,2021 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.

Q1. 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 Marks)**

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

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

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

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

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

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 Marks)**

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

Q2. Write short notes on the following: **(10 Marks)**

i An effective presentation
ii Difference between phone and walk-in-interview

Q3. 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 Marks)

i Corporate Companies venturing into education.
ii FDI in Retail
iii Social Media Tools (FaceBook and Twitter)
vi Young people must do voluntary work before entering the job market.

Q4. You visit an electronic stores since you want to purchase a new Android Smart TV. Write out the dialogue that you have with the sales person at the store. **(10 Marks)**

Q5. You have been asked to write a presentation on what improvements can be made to increase effective academic/practical counselling at your study centre. Consider the capacity building and use of faculty, course material, discussions and labs. **(15 Marks)**

Q6. Here are the answers to some questions. What are the questions? **(5 Marks)**

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.

Q7. Complete these sentences with the correct comparative or superlative form of the adjectives in (brackets) **(5 Marks)**

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.

Q8. Fill in the blanks with *a/an, the*. Leave the blanks unfilled if *no article* is necessary.

(5 Marks)

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.

Q9. Read this telephone conversation and then complete with suitable words. **(10 Marks)**

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.

Q10. How would you introduce yourself in each of these situations given below? **(5 Marks)**

i You meet a popular motivational speaker in a conference. Introduce yourself.
ii You meet an eminent scientist in a flight journey. Introduce yourself.

Course Code	**:**	**BCSL-056**
Course Title	**:**	**Network Programming and Administration Lab**
Assignment Number	**:**	**BCA(5)/L-056/Assignment/20-21**
Maximum Marks	**:**	**50**
Weightage	**:**	**25%**
Last date of Submission	**:**	**31st October, 2020 (For July,2020 Session)** **15th April, 2021 (For January,2021 Session)**

Note: Answer all the questions in the assignment having 40 marks in total. 10 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. Make suitable assumption is necessary.

Q1. (a) Write and execute a UDP client and a server program in C-language to perform the following tasks and show the result **(8 Marks)**

- The UDP client program sends a string (in lower case letters) to the UDP server program
- The UDP server program converts the string into upper case letters and then sends it to the client.

(b) Write the answer to the following queries: **(8 Marks)**

- What type of socket is created?
- What are the arguments used for sending and receiving messages ?

Q2. (a) Run the following Linux commands on your machine and show the output: **(5 Marks)**

- cat
- sort
- **ping**
- kill
- ps-ag

(b) Write and run commands in Linux for the following tasks: **(4 Marks)**

- To check if a particular process is running or not
- To see currently running processes and other informations like memory and CPU usages
- List all file names that have a letter h as 4th character in the name
- List all the file names that have the number 2 or 5 in the name

Q3. Setup a network connection in Linux. Configure it for Wireless networking. Once the internet connection is established, use **netstat** and **tcptrack**commands and show the results. **(7 Marks)**

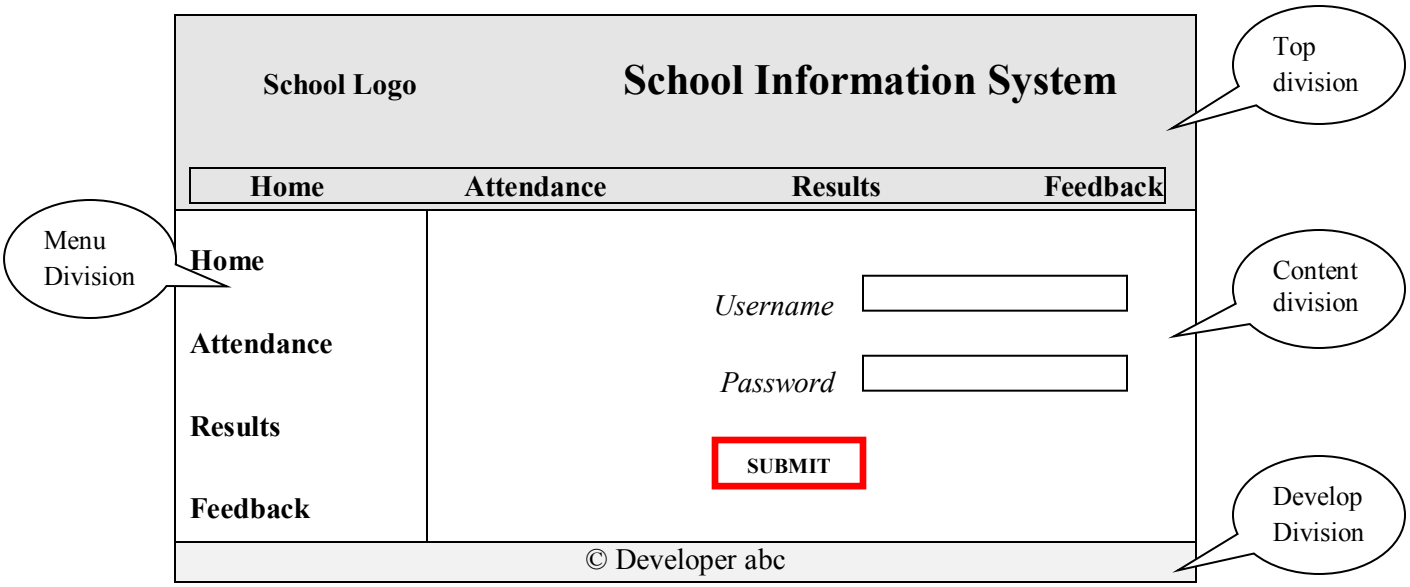
Q4. Configure the DHCP server on the Linux operating system . Write all the steps. Sort each column of the table and show the result **(8 Marks)**

Course Code	**:**	**BCSL-057**
Course Title	**:**	**Web Programming Lab**
Assignment Number	**:**	**BCA(5)/057/Assign/2020-21**
Maximum Marks	**:**	**50**
Weightage	**:**	**25%**
Last Dates for Submission	**:**	**31st October, 2020 (For July,2020 Session)** **15th April, 2021 (For January,2021 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.

Q1:

Create a website for a School which provides information about student's performance to their parents, who may register to the website. The website should be designed using logical divisions through tags and an external CSS file. Every page of the website should be divided into four divisions namely – Top, Develop, Menu and Content as displayed in the following figure:



Perform the following tasks for the website as given above:

[Part (a) : 10 Marks + Part (b) : 05 Marks + Part (c) : 05 Marks + Part (d) : 20 Marks]

(a) Create four pages for the website viz. Home, Attendance, Results and Feedback; all the four pages should have same *Top, Menu, and Develop* division but different *Content* division. The *Menu* Division should provide links to the Home page as well as all the other three pages. All these four menu options should be available in all the web pages designed by you for this assignment. Thus, this

Menu division may be used for navigating among the four web pages. The *Content* division of every page should be different. The information that should be displayed in *Content* Division of each of the pages is described below:

(i) The Home page should display a Welcome Message from the School and list the strengths of the School.

(ii) The Attendance page should display a form for logging into the Database of the School as shown.

(iii) The Results page should display the Results of a student to his/her parents.

(iv) The Feedback page should display a form asking for student name, class, a text area field for writing feedback information and a Submit Button.

(b) Create an external CSS that gives different background colour to each division. You may choose the format of other elements as per your choice.

(c) Create a JavaScript program that generates an error message if *Username* field is left blank in the form of Attendance page; or if the length of entered password in the password field is less than 6 characters. In case of an error, after displaying the error message, the login form should be displayed again.

(d) Implement the following using jsp program, servlets, java classes, database(s), etc. for the pages as described below:

(i) When a user presses Submit button after properly filling *Username* and *password* in the form in the Attendance page, these details are checked in a database, and in case, the entered username and password are correct, the Student Name, Class, days present and days absent are displayed on the screen. You may also create a cookie, if needed, to remember the username and password.

(ii) On selection of Results option, the result of student, whose parents have successfully logged in, is displayed. You may have to use cookies for this purpose.

(iii) When you press the Submit button of the *Feedback Form*, the information entered in the form should be stored in a database table.

(iv) You must design, create and use a suitable database for the purposes as above.

You may make suitable assumptions, if needed.

Course Code	**:**	**BCSL-058**
Course Title	**:**	**Computer oriented Numerical techniques Lab**
Assignment Number	**:**	**BCA(V)/L-058/Assignment/2020-21**
Maximum Marks	**:**	**50**
Weightage	**:**	**25%**
Last Dates for Submission	**:**	**15th October, 2020 (For July Session)** **15th April, 2021 (For January Session)**

This assignment has eight problems of 40 marks, each of 5 marks. All problems are compulsory. 10 marks are for viva voce. Please go through the guidelines regarding assignments given in the programme guide for the format of presentation.

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

Q1. **(5 Marks)**

Write a program that implements Gaussian elimination method with pivot condensation 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 program for solving the following system of linear equations:

$$5x - 7y + 8z = 11$$
$$4x - 9y + 3z = 2$$
$$9x + 2y + 5z = 25$$

Q2. **(5 Marks)**

Write a program that uses **Gauss-Seidel iterative method** to solve system of linear equations. Use the method to solve the system of linear equations given in Q. No. 1 above.

Q3. **(5 Marks)**

Write a program that approximates a root of the equation $f(x) = 0$ in an interval [a, b] using **Newton-Raphson** method. The necessary assumptions for application of this method should be explicitly mentioned. Use the method to find smallest positive root of the equation

$$2x^4 - 5x^2 + 10x - 32 = 0.$$

Q4. **(5 Marks)**

Write a program that uses Lagrangian polynomials for interpolation. You must use only three nodes such that the interpolating polynomial is at most quadratic. Using this program find approximate value of $f(x) = 5^x$ at $x = 1.5$. The nodes are at points $x_0 = 0$, $x_1 = 1$, $x_2 = 2$.

Q5. **(5 Marks)**

Write a program to interpolate using Newton's Backward difference formula using only three points. Solve Problem asked in Question 4 using Newton's Interpolating polynomial using Backward difference (instead of Lagrangian Polynomial).

Q6. **(5 Marks)**

Write a program that approximates the derivative of a given (differentiable) function $f(x)$ *at* $x = x_0$, using forward difference formula taking only 3 points having value of x as 0, 1 and 2 respectively. Using the program find the derivative of function $f(x)=(x)^{5/2}$ at x=0.5

Q7. **(5 Marks)**

Write a program that approximates the value of a definite integral

$$\int_a^b f(x)\ dx$$

using **Simpson's 1/3rd rule**, with M sample points. Find an approximate value of the integral of $2x^2 + x + 5$ using the program with 8 intervals over the interval [0, 4].

Q8. **(5 Marks)**

Write a program that approximates the solution of the initial value problem: $y' = f(t, y)$ with $y(a) = y_0$ over $[a, b]$ using **Euler's method**. Using the program to approximate the solution of the initial value problem:

$$y' = -2t^2y \quad \text{with} \quad y(0) = 1$$