**Data and File Structures**

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| **Session 1 : Arrays** | | |
| Sl No. | Questions | Page No. |
| 1 | Write a program in ‘C’ language that accepts two matrices as input and prints their product. |  |
| 2 | Write a program in ‘C’ language to accept 10 strings as input and print them in lexicographic order. |  |
| 3 | Write a program in ‘C’ language that accepts two strings s1 and s2 as input. The program should check if s2 is a substring of s1 or not. If s2 is a substring of s1, then the program should output the starting location and ending location of s2 in s1. If s2 appears more than once in s1, then the location of all instances have to given. |  |
| 4 | Write a program to concatenate two string s1 and s2. |  |
| **Session 2 : Structures** | | |
| 1 | Write a program in ‘C’ language which accepts Enrolment number, name aggregate marks secured in a program by a student. Assign ranks to students according to the marks secured. Rank-1 should be awarded to the students who secured the highest marks and so on. The program should print the enrolment number, name of the student and the rank secured in ascending order. |  |
| 2 | Write a program in ‘C’ language to multiply two spares matrices. |  |
| 3 | Write a program in ‘C’ language to accept a paragraph of text as input. Make a list of words and the number of occurrences of each word in the paragraph as output. As part of the processing, an array and structure should be created wherein each structure consists of two fields, namely, one for storing the word and the other for storing the number of occurrences of that word. |  |
| **Session 3 : Linked Lists** | | |
| 1 | Write a program in ‘C’ language for the creation of a list. Also write a procedure for deletion of an element the list. Use pointers.  You have to write the above program separately for Singly linked list, Doubly linked list and circularly linked list (both singly linked and doubly linked). Make necessary assumptions. |  |
| 2 | Write a program ‘C’ language that accepts two singly linked list A and B as input. Now, print a singly linked list that consists of only those elements, which are common to both A and B. |  |
| 3 | Write a program in ‘C’ language that accepts two singly linked lists of integers as input. Now, sort the elements of list in ascending order. Then, accept an integer as input. Insert this integer into the singly linked list at the appropriate position. |  |
| **Session 4 : Stacks** | | |
| 1 | Write a program in ‘C’ language to convert a prefix expression to a postfix expression using pointers. |  |
| 2 | Write a program in ‘C’ language to reverse an input string. |  |
| 3 | Write a program in ‘C’ language to implement multiple stacks in a single array. |  |
| **Session 5 : Queues** | | |
| 1 | Write a program in ‘C’ language to implement a Dequeue using Arrays. All operations associated with a Dequeue are to be implemented. |  |
| 2 | Write a program in ‘C’ language to implement a Dequeue using pointers. All operations associated with a Dequeue are to be implemented. |  |
| 3 | Write a program in ‘C’ language to reverse the elements of a queue. |  |
| 4 | Write a program in ‘C’ language to implement a queue using two stacks. |  |
| 5 | Write a program in ‘C’ language to implement a stack using two queues. |  |
| **Session 6 : Trees and Binary Trees** | | |
| 1 | Write a program in ‘C’ language for the creation of a binary tree. Also, provide for insertion and deletion operations. |  |
| 2 | Write a program in ‘C’ language for pre-order, post-order and in-order transversals of a binary tree. Don’t use recursion. |  |
| 3 | Write a program in ‘C’ language to accepts a tree as input and convert it into a binary tree. Print the resultant binary tree |  |
| 4 | Write a program in ‘C’ language to accepts a binary tree as input and check if the input binary tree is a full binary tree or not. |  |
| 5 | Write a program in ‘C’ language to accept two trees as input and check if both of them are the same. Give the appropriate message. |  |
| 6 | Write a program in ‘C’ language to count the number of leaves of a binary tree. |  |
| **Session 7 : Advanced trees** | | |
| 1 | Write a program in ‘C’ language to create a binary search tree. Also, accept a key value and search for it is BST. Print the appropriate message as output. |  |
| 2 | Write a program in ‘C’ language to insert 15,25,2,4,3,1,50 into an initially empty AVL tree. Make assumptions, if necessary. |  |
| **Session 8 : Graphs** | | |
| 1 | Write a program ‘C’ language to implement Dijkstra’s algorithm. |  |
| 2 | Write a program in ‘C’ language to implement Kruskal’s algorithm. |  |
| 3 | Write a program in ‘C’ language to accept an undirected graph as input and print the list of all vertices in the Graph, which are articulation points. |  |
| 4 | Write a program in ‘C’ language, which accepts a directed graph as input and prints all the strongly connected component of the Graph. |  |
| **Session 9 : Searching and Sorting** | | |
| 1 | Write a program in ‘C’ language to implement linear search using pointers. |  |
| 2 | Write a program in ‘C’ language to implement binary search using pointer. |  |
| 3 | Write a program in ‘C’ language to implement Quick sort using pointers. |  |
| 4 | Write a program in ‘C’ language to implement Heap sort using pointers. |  |
| 5 | Write a program in ‘C’ language to implement 2-way Merge sort using pointers. |  |
| 6 | Write a program in ‘C’ language to implement Bubble sort using pointers. |  |
| 7 | Write a program in ‘C’ language to implement Topological sort using pointers. |  |
| **Session 10 : Advanced Data Structures** | | |
| 1 | Write a program in ‘C’ language to insert 15,25,2,4,3,1 and 50 into an initially empty splay tree. |  |
| 2 | Write a program in ‘C’ language for the creation of a red black tree. Also, implement and insertion and deletion operations. |  |
| 3 | Write a program in ‘C’ language for the creation of an AA-tree Also, implement insertion and deletion operations. |  |
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**Operating System and Networking**

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| **Session 1 : Network Configuration** | | |
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| 1 | Run the Following commands and write the use of each command :   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Ipconfig | Ping | telnet | Diskpref | Netdiag | | Netstat | Pathping | ftp/tfp | Fc | Sfc | | Nbtstat | Rcp | Lpr | Tracert | Verifier | | Nslookup | Route | Lpq | Net session | Drivers | | Nettime | Rsh | Chkdsk | Hostname | Net accounts | |  |
| 2 | Use **arp** command to find your Ethernet physical address. |  |
| 3 | Modify the routing table using **ipxroute.** |  |
| 4 | View the TCP/IP settings. |  |
| 5 | Configure interfaces. |  |
| 6 | Configure routing protocols |  |
| 7 | Configure filters |  |
| 8 | Configure routes |  |
| 9 | Configure remote access |  |
| 10 | Use **winchart** command and communicate with your friend sitting on a different machine of windows 2000. |  |
| **Session 2 : Linux/Unix Operating Systems** | | |
| 1 | First try to execute the following commands on your operating system and write down the results and use of each command.   * Man(find manual help) * Cd * Ls, ls –a(try to find out other options of ls using man) * Cd . * Pwd * Cd .. * Ls –al * Ls –al | more * Cat passwd * Cd - * Chmod   We hope you will stop here and you will keep digging more and commands but do it after the session. |  |
| 2 | Try to the filesystem, write what is there in /bin, /usr/bin, /sbin, /tmp and /boot. Find and list the devices that are available in your system. |  |
| 3 | Make your own subdirectories called uni and linu in your home directory made? Ok, now delete the subdirectory called uni. |  |
| 4 | Create a file called ignou.txt that contains that contains the words “hello I am student of IGNOU”. Now copy this file and paste to other director. Copied? Can you move the file also from one directory to another? |  |
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| 5 | In the previous question you have a file ignou.txt; change its permission to rwxrwxr-x. you can try different possibilities to changes in its permissions. One possibility may be rwxr-xr-x permissions. Find out what are the different commands available that can used to change the permission of a file/files. |  |
| 6 | Display the names of all files in the home directory using find Can you display the names of all files in the home directory that are bigger than 500 KB. |  |
| 7 | Display a sorted list of all files in the home directory that contain the word ignou inside them. Hint: Use find and grep and sort. Can you use locate to find all filenames that contain the word ignou? |  |
| 8 | Use egrep to try to find out which lines in an ignou.txt file are satisfied by the regular expression given: **(^[0-9]{1,5}[a-zA-Z]+$)|none** and check the result with different combinations of lines. |  |
| 9 | Change your password and write down the restrictions for given password. |  |
| 10 | Open ignou.txt using vi editor, go to the end of the file and type in the following paragraph:  *In 1971 Bell labs releases the first Unix* ***Operatin****g System. Then 1985 Richard Stallman releases his GNU(“GNU is Not Unix”)Manifesto thus starting the open source revolution. He wanted to creat an open-source version of Unix. Stallman’s free Software Foundation eventually created the GNU General Public License (GPL) which is basically an anti-copyright also referred to as a*  Now you correct spelling errors in the first three lines and remove the extra “Unix” in the 3rd line of the paragraph. Add the words “copyleft” to the end of the paragraph. Replace the string “GNU is Not Unix” with a string “Unix is not a GNU”. Save the file and quit. Repeat the same exercise with emacs also. Write down the differences between the editors, also write which one you find easier and why. |  |
| **Session 3 : Linux/Unix Operating Systems** | | |
| 1 | Find the files (with full path) in your home directory those name are starting with the character ‘s’ and redirect the output into is file redirecting.txt and if you receive any error message on execution of the command redirect into errors txt. |  |
| 2 | Exercise sleep 25 in the foreground, suspend it with Ctrl+z and then put it into the background with bg. Show all process running in background, bring any process back into the foreground with fg. Repeat the same exercise using kill to terminate the process and use & for sending into background.(You need to see different options of the kill command). |  |
| 3 | Combine the commands cat nonexistent and echo helloIGNOU using suitable operators. Now reverse the order of the commands and try. |  |
| 4 | Write a shell scripts, which returns the PID of a process and accept the name of the process. |  |
| 5 | Use ping to find the round-trip delay to [www.ignou.ac.in](http://www.ignou.ac.in) |  |
| 6 | Send a message to all users which are online. Make provision so that you can send messages to other users but others cannot. Use talk to send messages. |  |
| 7 | Print a file ignou.txt, and then send multiple files to a printer. Write the command you will execute to remove any file from print queue. |  |
| 8 | Send a mail to yourself, and include ignou.txt inside the mail read the mail you have sent to yourself. Save the piece of message and file into some folder. Reply to self. |  |
| 9 | Use telnet and ftp to get connected with other remote machine. Write the problems you encounter during connection with remote machine. |  |
| 10 | Use the ls command and grep to display all names starting with “s”. |  |
| **Session 4 : System Administration using Unix & Linux** | | |
| 1 | Use finger or who to get a list of users on the machine. |  |
| 2 | Add different users, set their passwords and define permissions. Check whether you are able to change the passwords of all users or not. |  |
| 3 | Delete the user, which just now you have added. |  |
| 4 | Set the execution time of two jobs so that it can run automatically tomorrow, one at 11:00 a.m. and another at 1:00 p.m. After this setting, how can you change the time of execution of the job? |  |
| 5 | Try to access you’re your account available at a remote machine. Download some file from that machine to your machine. |  |
| 6 | Create a *cron* job that sends you a message after every 5 minutes. |  |
| 7 | Restart any system daemon like the web server *httpd.* |  |
| 8 | Write a message to inform all the users that “they should shutdown their machine after completing the lab exercises”. |  |
| 9 | Monitor the log time of users using xargs. |  |
| 10 | Eliminate file names from all users home directories containing bad characters and whitespace. |  |
| **Session 5 : Windows 2000: Introduction to networking** | | |
| 1 | Use different system tools and administrative tools. Write down the function of each tool in you lab notebook. |  |
| 2 | Add different users and groups. Also configure their permissions |  |
| 3 | Connect and configure your computer with a Local Networking Printer. |  |
| 4 | Install and configure. Windows 2000 Active Directory and Domain controller. |  |
| 5 | Create a hierarchical Directory tree. |  |
| 6 | Share any folder available in your directory, also configure its share permission for different users. |  |
| 7 | Install and configure TCP/IP. |  |
| 8 | Install a caching DNS server and find out how it reduces the network traffic. |  |
| 9 | Configure a DNS server as a root name server. |  |
| 10 | Implement delegated zones for a Domain Name Server. |  |
| **Session 6 : Windows 2000 : Server Management** | | |
| 1 | Install and configure Windows 2000 client. |  |
| 2 | Install and configure Windows 2000 server. |  |
| 3 | Set your printer on sharing and assign print permissions according to different users, configuring printer priorities for different groups. |  |
| 4 | Install and configure the DHCP server service. |  |
| 5 | Configure windows 2000 client to use DHCP, DNS, and WINS. |  |
| 6 | Configuring a window client as a VPN client. |  |
| 7 | Implement Dfs (Distributed file System) replication. |  |
| 8 | Install and configure Microsoft certificated server (MCS). |  |
| 9 | Install the network monitor driver and show how to capture data with network monitor. |  |
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| 10 | Implement different kind of servers like file server, print server and application server. Learn different routine administrator tasks for each kind of server. |  |
| **Session 7 : Window 2000 : Advances Networking** | | |
| 1 | Implement different groups in a workgroup and in a domain also. |  |
| 2 | Show how you can enhance the feature and strength of file and print servers with active directory. |  |
| 3 | Install the routing and remote access services for IP routing. |  |
| 4 | Install the RIP and OSPF protocols. |  |
| 5 | Configure web-based printer. |  |
| 6 | Install and configure Terminal Services. |  |
| 7 | Create a Remote Access Policy. Show how you can change the Remote Access logging setting. |  |
| 8 | Install the routing and remote access services as VPN server. Create a VPN Remote Access policy also. |  |
| 9 | Install and configure a web server. |  |
| 10 | Create two global groups and configure so that users from both groups should be able to access some command folders. |  |
| **Session 8 : Windows 2000 : Security** | | |
| 1 | Enable and configure IPsec policy on local computer. (Also Enable and configure IPsec policy for an entire domain.) |  |
| 2 | Protect client machine by using Internet Connection Firewall (ICF). |  |
| 3 | Configure TCP/IP packet filter. |  |
| 4 | Monitor the IP Routing status. |  |
| 5 | Customize and configure IPsec policy and rules for transport mode on the local computer. |  |
| 6 | Configure IPsec for tunnel mode.(Note: you need separate computers to which you have administrative access.) |  |
| 7 | Audit the IPsec logon activities and event. (note : you can use two IP capable computers that are able to communicate to each other with their administrative access.) |  |
| 8 | Install the network monitor application. Show the use of capture filter and display filter with the help of your own examples. |  |
| 9 | Configure PPTP packet filter such that it will block every packet stream except PPTP stream. |  |
| 10 | Implementing Server Security by Using Security Templates. |  |
| **Session 9 : Windows 2000 : Network Management** | | |
| 1 | Create a Group Policy Object (GPO) and Console. |  |
| 2 | Configuring Software Development Setting. |  |
| 3 | Configuring Remote and Removable Storage. |  |
| 4 | Setup the filter options for Advanced users and groups. |  |
| 5 | Backup and restore all files in a domain. |  |
| 6 | Protect Data by using Encrypting File System (EFS) and Recover Encrypted Data with a Data Recovery Agent. |  |
| 7 | Establishing Intrusion Detection for Public servers. |  |
| 8 | Configure the administrator account user profile to register to restrict the dial-up access. |  |
| 9 | Use the Registry Editor to view and search for information in any registry. Show how to add a value in a registry. Save the registry to some text file. |  |
| 10 | Enable network connectivity between Netware, Macintosh, and Unix networks. |  |
| **Session 10 : Windows 2000 : Troubleshooting** | | |
| 1 | Recover a window 2000 Server that Does Not Start. |  |
| 2 | Troubleshoot the “NTLDR Is Missing” Error Message in Machine. |  |
| 3 | What you should do when you find that the drive letter changes after you restart your computer. |  |
| 4 | Backup the recovery agent Encrypting File System (EFS) private key. |  |
| 5 | Encrypt Files and Folders on a Remote Windows 2000 Server. |  |
| 6 | If you cannot print to a network printer after adding Internet connection sharing, how will you resolve it? |  |
| 7 | When you install modem, how to enable/disable call waiting on computer. |  |
| 8 | If you are having trouble getting a dial-up connection and you want to check the modem’s response how you will check to do it. If you are having noisy channel and you are not able to connect write down the series of steps you will be following to detect and correct it. |  |
| 9 | When you use a dial-up remote access service (RAS) connection to browse the internet or to a private network, your computer may hang and return a stop error: “Stop 0x00000000A”. Resolve this problem. |  |
| 10 | When you attempt to view a web page and receive an error message “Not accepting cookies”, how will you resolve it.? |  |

**Database Management System**

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**JAVA Programming**

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| **Session 1 : Data types, variables and operators** | | |
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| 1 | Write a program in java to implement the formula (Area = Height \* width) to find the area rectangle. Where height and width are the rectangle’s height and width. |  |
| 2 | Write a program in java to find the result of following expression (Assume a = 10,b = 15)   1. (a < < 2) + (b > >2) 2. (a)||(b > 0) 3. (a + b\* 100)/10 4. a & b |  |
| 3 | Write a program in java to explain the use of break and continue statements |  |
| 4 | Write a program in java to find the average of marks you obtained in your 10+2 class |  |
| **Session 2 : Statements and Array** | | |
| 1 | Write a program in java to find A x B where A is a matrix of matrix of 3x3 and B is a matrix of 3x4. Take the values in matrixes A and B from user. |  |
| 2 | Write a program in java to compute the sum of digits of a given integer. Remember, your integer should not be less than five digits.(e.g if input is 23451 then sum of digit of 23451 will be 15). |  |
| **Session 3 : Class and Objects** | | |
| 1 | Write a program in java with class rectangle with data fields width, length, area and colour. The length width and area are of double type and colour is of string type. The methods are set\_length(), set\_width(), set\_colour(), and find area(). Create two objects then display “Matching Rectangles”, otherwise display “Non matching Rectangle ”. |  |
| 2 | Create a class Account with two overloaded constructors. The first constructor is used for initializing, the name of account holder, the account number and the intial amount in the account. The second constructor is used for initializing the name of the account holder, the account number the address, the type of account and the current balance. The Account class is having methods Deposit(), withdraw(),and Get\_balance().make necessary assumption for data members and return type of methods. Create objects of Accounts class and use them. |  |
| 3 | Write a program in java to create two stacks class of variable size with push() and pop() methods. Create two objects of stack with 10 data items in both. Compare the top elements of both stack and print the comparison result. |  |
| **Session 4 : Inheritance and polymorphism** | | |
| 1 | Write a java program to show that private member of a super class cannot be accessed from derived classes. |  |
| 2 | Write a program in java to create a player classes. Inherit the classes cricket-player(), football\_player and hockey\_player from player class. |  |
| 3 | Write a class worker and derived classes daily worker and salaried worker from it. Every worker has a name and a salary rate. Write method compay to compute the week pay of every worker. A daily worker is paid on the basis of the number of days s/he works. The salaried worker gets paid the wages for 40 hours a week no matter what the actual hours are. Test this program to calculate the pay of workers. You are excepted to use the concept of polymorphism to write this program. |  |
| 4 | Consider the trunk calls of a telephone exchange. A trunk call can be ordinary, urgent or lighting. The charges depend on the duration and the type of the call. Write a program using the concept of polymorphism in java to calculate the charges. |  |
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| **Session 5 : Package and Interface** | | |
| 1 | Write a program to make a package balance in which has Accident class with display\_balance method in it. Import balance package in another program to access display\_balance method of Account class. |  |
| 2 | Write a program in java to show the usefulness of interface as a place to keep constant value of program. |  |
| 3 | Create an interface having two methods division and modules. Create a class, which overrides these methods. |  |
| 4 | Write a program in java which implements interface student which has two methods display\_grade and atrendence for PG\_students and UG\_students. |  |
| **Session 6 : Exception Handling** | | |
| 1 | Write a program in java to display the names and roll numbers of students. Initialize respective array variables for 10 students. Handle ArrayIndexOutOfBoundsException, so that any such problem doesn’t cause illegal termination of program. |  |
| 2 | Write a java program to enable the user to handle any chance of divide by zero exception. |  |
| 3 | Create an exception class which throws an exception if operand is non – numeric in calculating modules. |  |
| 4 | On a single track two vehicles are running. As vehicles are going in same direction there is no problem. If the vehicles are running in different direction there is a chance of collision. To avoid collision. Write a java program using exception handling. You are free to make necessary assumptions. |  |
| **Session 7 : Multithreading** | | |
| 1 | Write a java program to create five threads with different priorities. Send two threads of the highest priority to sleep state. Check the aliveness of the threads and mark which thread is long lasting. |  |
| 2 | Write a program to launch 10 threads. Each thread increments a counter variable. Run the program with synchronization. |  |
| 3 | Write a program for generating 2 threads, one for printing even numbers and the other for printing odd number. |  |
| 4 | Write a program using thread synchronization in multithreading (you can take some objects visible on screen for real time effect ). |  |
| **Session 8 : Reading, Writing and String handling in java** | | |
| 1 | Write a program in java to create a string object. Initialize this object with your name. find the length of your name using the appropriate string method. Find whether the character ‘a’ is in your name or not; if yes find the number of times ‘a’ appears in your name. print locations of occurrences of ‘a’. try the same for different string objects. |  |
| 2 | Write a program in java for string for handling which performs the following :   1. Checks the capacity of StringBuffer objects. 2. Reverse the contents of a string given on console and converts the resultant string in upper case. 3. Reads a string from console and appends it to the resultant string of ii. |  |
| 3 | Write a program for searching string for the first occurrence of a character or substring and for the last occurrence of a character or substring. |  |
| 4 | Write a program in java to read a statement from console, convert it into upper case and again print on console. |  |
| 5 | Write a program in java, which takes the name of a file from user, read the contents of the file and display it on the console. |  |
| 6 | Write a java program to copy a file into another file. |  |
| **Session 9 : Applets and its applications** | | |
| 1 | Write a java Applet program which reads your name and address in different text fields and when a button named find is pressed the sum of the length of characters in name and address is displayed in another text field. Use appropriate colors layout to make your applet look good. |  |
| 2 | Create an applet which displays a rectangle /string with specified color & coordinate passed as parameter from the HTML file. |  |
| 3 | Create an Applet which will display the calendar of a given date. |  |
| 4 | Write a program to store student’s detail using card layout. |  |
| 5 | Write a java Applet program which provides a text area with horizontal and vertical scrollbars. Type some lines of text area and use scrollbars for movements in the text area. Read a word in a text field and find whether the word is in the content of the text area or not. |  |
| **Session 10 : Networking and other advanced feature and JAVA** | | |
| 1 | Write a java program to find the find numeric address of the following web sites   1. [www.ignou.ac.in](http://www.ignou.ac.in) 2. [www.indiatimes.com](http://www.indiatimes.com) 3. [www.rediff.com](http://www.rediff.com) 4. [www.apple.com](http://www.apple.com)   In addition to this find the internet address of your local host. |  |
| 2 | Create an applet which takes name and age as parameters and display the message “<name> is <age> year old”. Print the URL of the class file. |  |
| 3 | Write a program to test Socket functionality for appropriate hostname and port number. |  |
| 4 | Write a program to connect to a database created in MS-ACCESS/SQL-SERVER/ORACLE using JDBC concept, perform basic operations of Selection, Insertion and Deletion on the database. |  |
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