BACHELOR OF COMPUTER APPLICATIONS (BCA)

(Revised Syllabus)

BCA(Revised Syllabus)/ASSIGN/SEMESTER-VI

ASSIGNMENTS

(July - 2025 & January – 2026 sessions)

(BCS-062,MCS-022,BCSL-063)

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	**:**	**MCS-022**
Course Title	**:**	**Operating System Concepts and Networking Management**
Assignment Number	**:**	**BCA(VI)/022/Assignment/2025-26**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Dates for Submission	**:**	**31st October, 2025 (For July, Session)**
	:	**30th April, 2026 (For January, Session)**

Note: This assignment has eight questions for a total of 80 marks. Answer all the questions. The rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance the explanations. Answer of each part of the question should be confined to about 300 words.

Q1.

(a) Compare and contrast a Network Operating System (NOS) with a Distributed Operating System (DOS). Highlight their key differences in terms of resource management, user perception (transparency), and fault tolerance. Provide one example for each type of OS. **(5 Marks)**

(b) Explain the concept of a system call in an operating system. Describe the sequence of steps that occur when a user program makes a system call to read data from a file. Use a diagram to illustrate the transition between user mode and kernel mode. **(5 Marks)**

Q2.

(a) Consider a system with three processes (P1, P2, P3) and three resource types (R1, R2, R3). At a particular instance, the system state is as follows:

- Total instances of R1=10, R2=5, R3=7.

Process	Allocation (R1, R2, R3)	Max Need (R1, R2, R3)
P1	0, 1, 0	7, 5, 3
P2	2, 0, 0	3, 2, 2
P3	3, 0, 2	9, 0, 2

Using the Banker's Algorithm, determine:
(i) The content of the 'Available' and 'Need' matrices.
(ii) Is the system in a safe state? If yes, provide a safe sequence. Justify your answer.

(5 Marks)

(b) Differentiate between pre-emptive and non-pre-emptive scheduling algorithms. Provide one example for each and explain a scenario where one would be more suitable than the other. **(5 Marks)**

Q3.

(a) A system uses a paging memory management scheme with a page size of 4 KB. The logical address space of a process is 64 KB.
(i) How many pages are in the logical address?
(ii) If the physical memory size is 128 KB, how many frames are in the physical memory?

(iii) For the logical address 20500, calculate the page number and the offset.

(5 Marks)

(b) What is "thrashing" in the context of virtual memory? Explain why it occurs and describe two methods an operating system can use to prevent or handle thrashing. **(5 Marks)**

Q4.

(a) Explain the structure of an Inode in a Linux/UNIX file system. What key information does it store about a file? Why is the Inode-based approach efficient for managing file metadata? **(5 Marks)**

(b) Write a shell script in Linux that takes a directory name as a command-line argument. The script should count the number of files and sub-directories within the given directory and display the counts separately. It should also display an error message if the argument is not a valid directory. **(5 Marks)**

Q5.

(a) Describe the purpose and logical structure of Active Directory in a Windows Server environment. Explain the roles of a Domain, Tree, and Forest in organizing network resources. **(5 Marks)**

(b) Differentiate between a "workgroup" and a "domain" model in a Windows networking environment. List two advantages of using a domain model over a workgroup for a medium-sized organization.

(5 Marks)

Q6.

(a) Explain the step-by-step process of configuring a user's machine to obtain an IP address automatically from a DHCP server. Describe the four-step DORA (Discover, Offer, Request, Acknowledge) process.

(5 Marks)

(b) What is a DNS (Domain Name System) server? Differentiate between an authoritative DNS server and a caching DNS server. **(5 Marks)**

Q7.

(a) What is IPsec? Explain its two primary modes of operation: Transport Mode and Tunnel Mode. Use diagrams to illustrate how the packet structure changes in each mode. **(5 Marks)**

(b) What is EFS (Encrypting File System) in Windows? How does it provide security for files stored on a local disk? **(5 Marks)**

Q8. Write short notes on the following: **(10 Marks)**

(a) The role of a RAID (Redundant Array of Independent Disks) system, specifically explaining RAID 0 and RAID 1.
(b) The concept of a Virtual Private Network (VPN) and its benefits.
(c) User and Group management in Linux, including the purpose of chown and chmod commands.
(d) The difference between a hub, a switch, and a router.