

BACHELOR OF COMPUTER APPLICATIONS (BCA_NEWOL)

BCA_NEWOL /ASSIGN/SEMESTER-IV

ASSIGNMENTS

(January - 2026 & July - 2026)

MCS-206, BCSL-146, BCS-053, BCSL-147, BCS-041, BCOC-131,



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 through the Learning Management System (LMS) 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_NEWOL 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_NEWOL Programme Guide.

Course Code	:	BCS-041
Course Title	:	Fundamentals of Computer Networks
Assignment Number	:	BCA_NEWOL(IV)/041/Assignment/2026
Maximum Marks	:	100
Weightage	:	25%
Last Date of Submission	:	30th April, 2026 (for January Session) 31st October, 2026 (for July Session)

This assignment has eight questions for a total of 80 marks. Answer all the questions. Each question carries 10 marks. Rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance explanations.

Question 1:

- Explain the basic working principle of **optical fiber communication**. How does light propagation differ in various types of optical fibers? **(5 Marks)**
- Describe the **TCP/IP reference model**. Explain the responsibilities of each layer and mention at least two commonly used protocols associated with every layer. **(5 Marks)**

Question 2:

- What is meant by **routing instability** in computer networks? Explain how incorrect routing information can spread among routers with the help of an example. **(5 Marks)**
- Define **modulation** in data communication. Explain **angle-based modulation techniques** and discuss any two challenges associated with their use. **(5 Marks)**

Question 3:

- A data stream 10101101 is to be transmitted using CRC. The generator polynomial is $x^3 + x + 1$. Calculate the CRC bits and write the final transmitted frame. Show all intermediate steps. **(5 Marks)**
- Explain the concept of a **self-organizing wireless network**. Why are such networks useful in situations where fixed infrastructure is unavailable? **(5 Marks)**

Question 4:

- What role does **ICMP** play in IP-based networks? Classify ICMP messages and explain their importance with suitable examples. **(5 Marks)**
- Define a **Network Interface Card (NIC)**. Explain how modern NICs handle data transmission efficiently between memory and the network medium. **(5 Marks)**

Question 5:

- Explain the purpose of **cryptographic hash functions**. Describe the main stages involved in generating a message digest using a standard hashing algorithm. **(5 Marks)**

- b) Differentiate between a **hub** and a **switch**. Also explain how switching decisions differ between **Layer-2 switches** and **Layer-3 switches**. (5 Marks)

Question 6:

- a) Compare **POP3** and **IMAP4** in terms of message storage, synchronization, and client support. Which protocol is more suitable for multi-device access and why? (5 Marks)
- b) In a public key cryptosystem, two prime numbers are selected as $p = 7$ and $q = 11$. Calculate the public key and private key using the RSA approach. (5 Marks)

Question 7:

- a) Compare **contention-based access methods** with **controlled access methods** in local area networks. Highlight their advantages and limitations. (5 Marks)
- b) Explain the **round-robin scheduling technique** used in data transmission. How does it differ from polling-based access control? (5 Marks)

Question 8:

- a) Describe the working principle of **distance-based routing algorithms**. What are the major drawbacks of such routing methods in large networks? (5 Marks)
- b) Define **Quality of Service (QoS)** in networking. Explain any three techniques used by networks to ensure better QoS for real-time applications. (5 Marks)