BACHELOR OF COMPUTER APPLICATIONS
(BCA_NEW)

ASSIGNMENTS

(January - 2026 & July - 2026)

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

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SCHOOL OF COMPUTER AND INFORMATION SCIENCES

INDIRA GANDHI NATIONAL OPEN UNIVERSITY
MAIDAN GARHI, NEW DELHI – 110 068

Course Code : **BCS-041**
Course Title : **Fundamentals of Computer Networks**
Assignment Number : **BCA_NEW(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:

a) Explain the basic working principle of **optical fiber communication**. How does light propagation differ in various types of optical fibers? **(5 Marks)**

b) 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:

a) 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)**

b) Define **modulation** in data communication. Explain **angle-based modulation techniques** and discuss any two challenges associated with their use. **(5 Marks)**

Question 3:

a) 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)**

b) 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:

a) What role does **ICMP** play in IP-based networks? Classify ICMP messages and explain their importance with suitable examples. **(5 Marks)**

b) Define a **Network Interface Card (NIC)**. Explain how modern NICs handle data transmission efficiently between memory and the network medium. **(5 Marks)**

Question 5:

a) 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)**