

# **BACHELOR OF COMPUTER APPLICATIONS (BCAOL)**

## **(Revised Syllabus)**

BCA(Revised Syllabus)/ASSIGN/SEMESTER-IV

### **ASSIGNMENTS**

**(July – 2025 & January – 2026 sessions)**

**(BCS-040, MCS-024, BCS-041, BCS-042,  
MCSL-016, BCSL-043, BCSL-044, BCSL-045)**



**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.

<b>Course Code</b>	:	<b>BCS-041</b>
<b>Course Title</b>	:	<b>Fundamentals of Computer Networks</b>
<b>Assignment Number</b>	:	<b>BCA (IV)/041/Assignment/2025-26</b>
<b>Maximum Marks</b>	:	<b>100</b>
<b>Weightage</b>	:	<b>25%</b>
<b>Last Date of Submission</b>	:	<b>31<sup>st</sup> October, 2025 (For July Session) 30<sup>th</sup> April, 2026 (For January Session)</b>

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

- Q1.** An organization is assigned a network block of **202.41.80.0/26**. The administrator needs to further divide this block into smaller subnets. **(10 Marks)**
- How many subnets can be created from this block if each new subnet requires at least 25 hosts?
  - What will be the new subnet mask for these smaller subnets?
  - For the first two of these new subnets, provide the:
    - Subnet Address
    - Range of Usable Host IP Addresses
    - Broadcast Address
- Q2.** Imagine you open a web browser and type <https://www.ignou.ac.in> and press Enter. Trace the journey of this request from your computer to the IGNOU server. Explain the role of at least four different protocols (e.g., DNS, HTTP, TCP, IP) and how the TCP/IP layers on your machine (Application, Transport, Network, Data Link) encapsulate the data to make this happen. **(10 Marks)**
- Q3.**
- A sender needs to transmit the data frame 10111001. The generator polynomial to be used for CRC is  $P(x) = x^3 + 1$ . Calculate the CRC checksum and determine the final codeword that will be transmitted. Show all steps of the binary division. **(5 Marks)**
  - Why is CRC considered a more robust error detection mechanism compared to a two-dimensional parity check? **(5 Marks)**
- Q4.** Differentiate between CSMA/CD and CSMA/CA based on the following criteria: **(10 Marks)**
- Full Form and Primary Goal (Detecting vs. Avoiding Collisions).
  - Typical Network Environment (Wired Ethernet vs. Wireless LAN).
  - Mechanism (How it handles channel access and collisions).
  - Acknowledgment (Whether acknowledgments are typically used).
- Q5.** Compare and contrast **Distance-Vector** and **Link-State** routing algorithms. Your answer should cover: **(10 Marks)**
- The information shared between routers (Routing table vs. Topology map).
  - The frequency and scope of updates.
  - Susceptibility** to common problems like the "Count-to-Infinity" problem and slow convergence.
  - Provide one example protocol for each algorithm (e.g., RIP, OSPF).

**Q6.**

- a) Compare TCP (Transmission Control Protocol) and UDP (User Datagram Protocol) based on their reliability, connection management, and flow control mechanisms. **(6 Marks)**
- b) For each of the following applications, choose whether TCP or UDP would be more appropriate and justify your choice in one sentence: **(4 Marks)**
  - (i) Live video streaming
  - (ii) A large file download
  - (iii) A DNS query
  - (iv) Online banking transaction

**Q7.** Write short notes on the primary function and working mechanism of the following application layer protocols:

- a) **DNS (Domain Name System):** Explain how it resolves a domain name into an IP address. **(4 Marks)**
- b) **FTP (File Transfer Protocol):** Explain the purpose of its two connections (control and data). **(3 Marks)**
- c) **SMTP (Simple Mail Transfer Protocol):** Describe its role in sending an email from a client to a server. **(3 Marks)**

**Q8.**

- a) Explain the fundamental difference between Symmetric Key Cryptography and Asymmetric Key Cryptography in terms of the keys used for encryption and decryption. **(4 Marks)**
- b) In an RSA cryptosystem, the prime numbers chosen are  $p = 5$  and  $q = 11$ , and the public exponent is  $e = 7$ .
  - (i) Calculate the value of  $n$  and  $\phi(n)$ . **(2 Marks)**
  - (ii) Determine the private key  $d$ . **(2 Marks)**
  - (iii) Encrypt the message  $M = 8$ . **(2 Marks)**