No. of Printed Pages : 4

Sl. No.

# B1.5-R5 : DATA COMMUNICATIONS AND COMPUTER NETWORKS

**DURATION : 03 Hours** **MAXIMUM MARKS : 100**

**Roll No. :** | | | | | | |

**Answer Sheet No. :** | | | | | | |

**Name of Candidate :** _____ **; Signature of Candidate :** _____

**INSTRUCTIONS FOR CANDIDATES :**

- Carefully read the instructions given on Question Paper, Answer Sheet.
- Question Paper is in English language. Candidate has to answer in English Language only.
- **Question paper contains Seven questions. The Question No. 1 is compulsory. Attempt any FOUR Questions from Question No. 2 to 7.**
- **Parts of the same question should be answered together and in the same sequence.**
- **Questions are** to be answered in the **ANSWER SHEET** only, supplied with the Question Paper.
- **Candidate cannot leave the examination hall/ room without signing on the attendance sheet and handing over his/her Answer Sheet to the Invigilator. Failing in doing so, will amount to disqualification of Candidate in this Module/Paper.**
- After receiving the instruction to open the booklet and before answering the questions, the candidate should ensure that the Question Booklet is complete in all respects.

**DO NOT OPEN THE QUESTION BOOKLET UNTIL YOU ARE TOLD TO DO SO.**

**1.** (a) What are the design issues of the data link layer ?

(b) What is the concept of subnetting in IP ? What is a subnet mask ?

(c) Explain what is meant by classless IP addressing scheme.

(d) Explain the Multipurpose Internet Mail Extension (MIME) protocol.

(e) What is a socket address ? Describe in brief.

(f) A code scheme has a Hamming distance d min == 4. What is the error detection and correction capability of this scheme ?

(g) What are the differences between a switch and a router ? **(7x4)**

**2.** (a) What is a transparent bridge ? Explain its functionality.

(b) What is the role of a gateway ? Explain its main functionalities.

(c) Calculate the maximum data rate or capacity of a noisy channel whose bandwidth is 1 MHz and whose signal-to-noise ratio is 40 dB. **(6+6+6)**

**3.** (a) Briefly explain the logical connection of ATM.

(b) Write down the key characteristics of SDN.

(c) What are the fields that are related to fragmentation in IPv4 datagram ? Describe them briefly. **(6+6+6)**

**4.** (a) How do IntServ and DiffServ differ in terms of Resource Management and Scalability ?

(b) Write down the purpose of the DNS resolver. Which port number is used by the DNS server for both TCP and UDP connections ?

(c) What are stateless and stateful protocols ? Is HTTP stateless or stateful ? What is the role of cookies ? **(6+6+6)**

**5.** (a) What is supernetting ? Why is it needed ?

(b) You have been assigned the IP address 192.168.10.0/24 for a new network segment. Subnet the given IP address into three subnets, ensuring that each subnet has a sufficient number of host addresses.

(i) Calculate the subnet mask, network address, broadcast address and valid range of IP addresses for each subnet.

(ii) Determine the number of usable host addresses in each subnet. Provide your answers in CIDR notation and dotted-decimal format. **(6+12)**

**6.** (a) What are two widely used communication protocols in Internet of Things (IoT) systems ? Briefly explain the role of each protocol in IoT deployments and provide an example of a scenario where each protocol would be suitable.

(b) What are TCP Sockets and how do they work in Python ? **(9+9)**

**7.** (a) In the OSI model, both the data link layer and transport layer are involved in error control. Why is the same activity required twice ?

(b) Differentiate between baseband and broadband transmission.

(c) Explain Pulse Code Modulation. **(6+6+6)**

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**SPACE FOR ROUGH WORK**

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