KONERU LAKSHMAIAH EDUCATION FOUNDATION
(Deemed to be University, Estd. u/s. 3 of UGC Act 1956)

Academic year: 2024-25

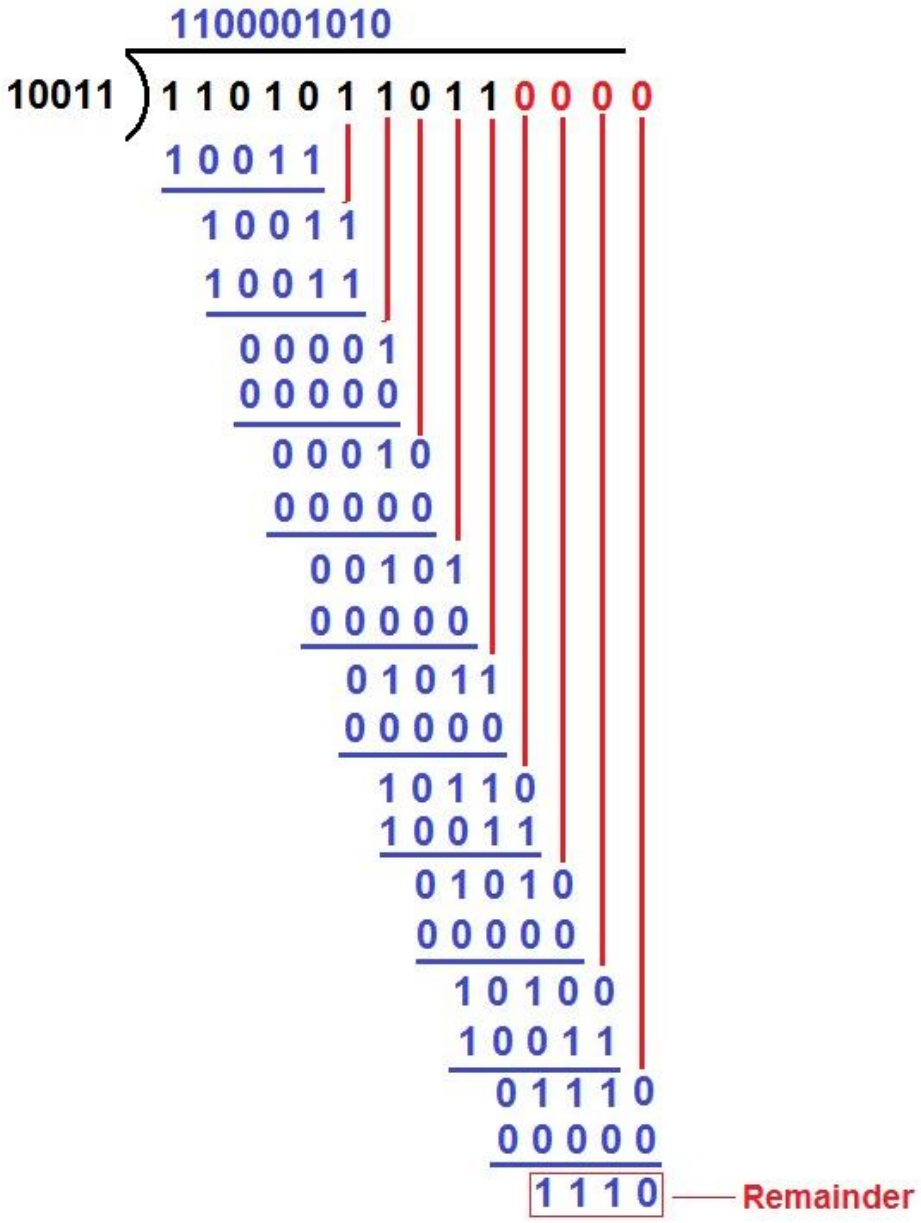
Home Assignment-I

B. Tech. (ECE, CSE, IOT, CSIT), 2023 Batch

II/IV, 2nd Semester

23EC2210R: NETWORK PROTOCOLS & SECURITY

1. Illustrate cyclic redundancy check (CRC). Show the calculation polynomial code checksum for frame 1101011011 using the generator (x4+ x+1)



2. Elaborate on the components of computer networks, detailing their functions and significance in the construction of a computer network.

1. **Hub** – A basic device that connects multiple computers in a network and broadcasts data to all connected devices. Simple but inefficient for large networks.
2. **Switch** – An intelligent device that forwards data only to the intended recipient using MAC addresses, reducing congestion and improving network speed.
3. **Modem** – Converts digital signals to analog and vice versa, enabling internet access over telephone or cable lines.
4. **Router** – Directs data between networks, connects LAN to the internet, and enhances security with firewalls.
5. **Cables & Connectors** – Physical links for wired networking (Ethernet, fiber-optic, coaxial) ensuring reliable data transmission.
6. **Network Interface Card (NIC)** – A hardware component that connects a computer to a network via wired (Ethernet) or wireless (Wi-Fi) communication.

3. Discuss in detail neat flow diagrams of Go-Back-N ARQ and justify the reason how window concept helps in flow control.

Go-Back-N ARQ and Flow Control

Go-Back-N ARQ allows sending multiple frames (up to **N**) before acknowledgment. On error, the sender retransmits the affected frame and all subsequent frames.

Flow Diagram

✅ **Normal Transmission (No Errors)**

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```
Sender          Receiver
  | → Frame 0 → |
  | → Frame 1 → |
  | → Frame 2 → |
  | ← ACK 0  ← |
  | ← ACK 1  ← |
  | ← ACK 2  ← |
```

❌ **Error Handling (Retransmission)**

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```
Sender          Receiver
  | → Frame 0 → |
  | → Frame 1 → |
  | → Frame 2 ❌ (Error) |
  | ← ACK 1  ← |
  (No ACK for Frame 2)
  | → Retransmit Frame 2 → |
  | → Retransmit Frame 3 → |
  | ← ACK 2  ← |
```

How Windowing Helps in Flow Control

- **Efficient Flow** – Sends multiple frames before ACKs.
- **Error Handling** – Retransmits lost/corrupted frames in order.
- **Congestion Control** – Receiver slows sender if overloaded.
- **Better Bandwidth** – Minimizes idle time vs. stop-and-wait.

4. Given Message P = 7 1 4 2 6 9 8 3 5. Payload size of frames: F1 =2, F2 = 4, F3 = 3. Perform byte count method and write the final byte sequence.

Given Data

Message: **P = {7, 1, 4, 2, 6, 9, 8, 3, 5}**

Frame sizes:

- **F1 = 2** → Contains **{7, 1}**
- **F2 = 4** → Contains **{4, 2, 6, 9}**
- **F3 = 3** → Contains **{8, 3, 5}**

Constructing Frames with Byte Count

Each frame starts with a **count byte** followed by its respective data.

Frame	Byte Count	Data
F1	2	7, 1
F2	4	4, 2, 6, 9
F3	3	8, 3, 5

Final Byte Sequence

The final byte sequence (including byte counts) will be:

2, 7, 1, 4, 4, 2, 6, 9, 3, 8, 3, 5

5. Compare and contrast the client-server and peer-to-peer network models, highlighting their key differences, advantages, and disadvantages.

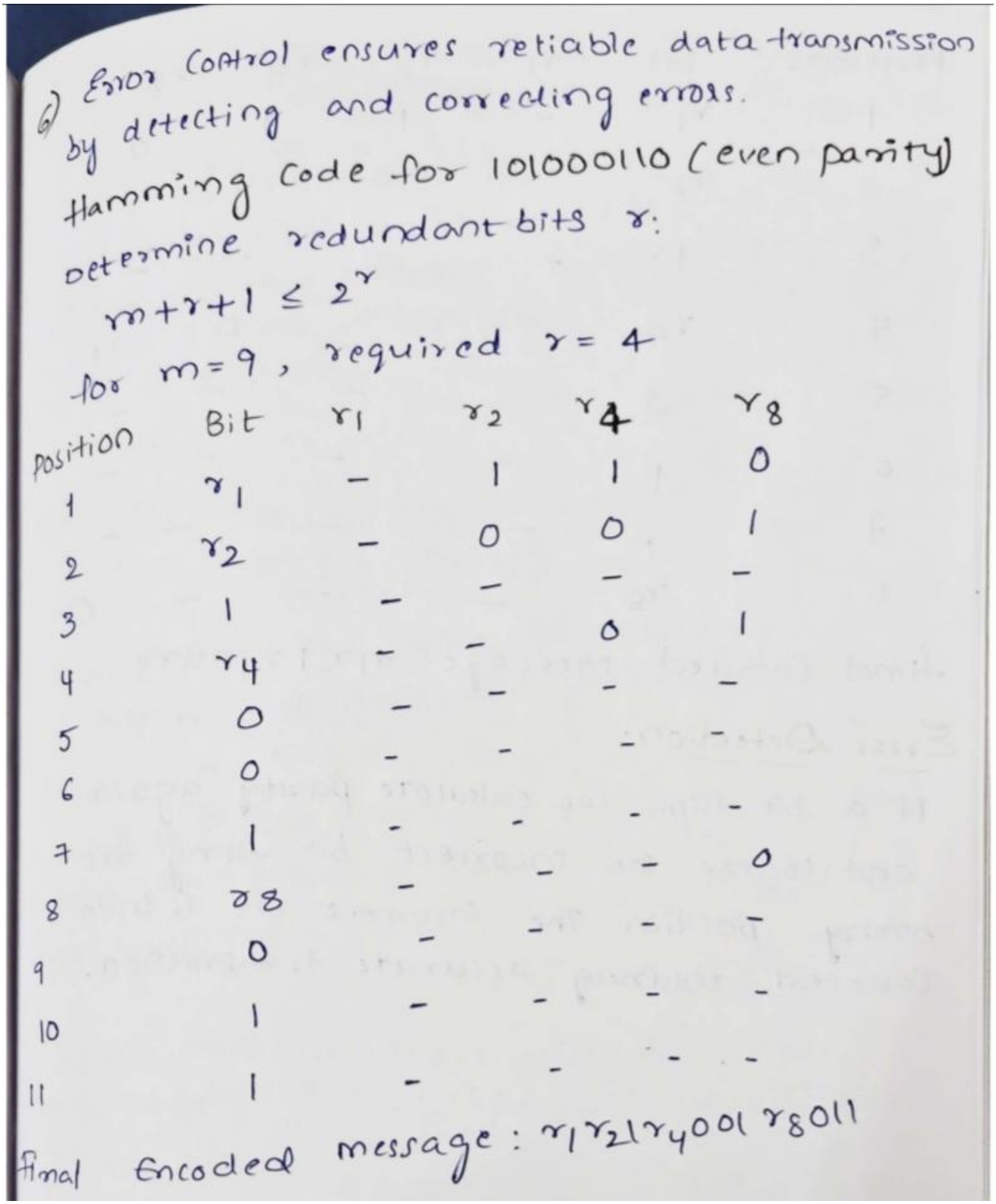
key differences

Aspect	Client-Server	Peer-to-Peer (P2P)
Setup	Centralized (server & clients)	Decentralized (all devices equal)
Sharing	Server shares resources	Everyone shares resources
Growth	Limited by server capacity	Easy to grow with more peers
Security	Easier to control	Harder to control
Cost	Expensive (needs a server)	Cheaper (no server needed)
Failure Risk	If the server fails, everything stops	No central failure point
Management	Easier to manage centrally	Harder to manage

advantages, and disadvantages.

Model	Advantages	Disadvantages
Client-Server	Centralized management, secure, scalable	Single point of failure, expensive
Peer-to-Peer	Decentralized, cost-effective, scalable	Harder to manage, security issues

6. Outline the necessity of Error Control. Find the Hamming code for the data 101000110 for even parity with a detailed description.



6) Error control ensures reliable data transmission by detecting and correcting errors.

Hamming code for 101000110 (even parity)

determine redundant bits r:

$$m + r + 1 \leq 2^r$$

for $m = 9$, required $r = 4$

position	Bit	r_1	r_2	r_4	r_8
1	r_1	–	1	1	0
2	r_2	–	0	0	1
3	1	–	–	–	–
4	r_4	–	–	0	1
5	0	–	–	–	–
6	0	–	–	–	–
7	1	–	–	–	–
8	r_8	–	–	–	0
9	0	–	–	–	–
10	1	–	–	–	–
11	1	–	–	–	–

final Encoded message : $r_1 r_2 1 r_4 001 r_8 011$

7. Compute hamming code for the message M=101101 using even parity. Show the step-by-step process and justify the process of error detection by taking any bit change in the transit.