**SIMATS ENGINEERING**

**SAVEETHA INSTITUTE OF MEDICAL AND TECHNICAL SCIENCES**

**CHENNAI-602105**

**ASSIGNMENT - 4**

**CSA0735 - COMPUTER NETWORKS**

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| **S.No.** | **Register Number** | **Name** | **Questions** |
| 1 | 192524212 | ADUSURU HARSHA VARDHAN | **Scenario**: A university server handles TCP and UDP requests from 500 students during peak hours. **Parameters**: Multiplexing, Demultiplexing, Port Numbers **Questions**:   1. If each TCP connection uses a unique source port, how many ports are used for 500 connections? 2. How many bits are used in the port field of the TCP/UDP header? 3. What is the maximum number of simultaneous connections possible using 16-bit port numbers? |
| 2 | 192511137 | ARSHIYA A | **Scenario:** A streaming service sends video using UDP. **Parameters**: UDP header size, packet loss, efficiency **Questions**:   1. If each video packet is 1000 bytes and 50 bytes are UDP + IP headers, what is the overhead percentage? 2. If 2% of packets are lost, how many out of 5000 packets fail to reach the receiver? 3. If one stream sends 2 Mbps to 100 users via UDP unicast, what is total bandwidth? |
| 3 | 192571057 | B S JAYANISANTH | **Scenario:** A web server handles HTTP requests over TCP using a socket. **Parameters**: TCP connection, 3-way handshake, RTT **Questions**:   1. If the RTT is 200 ms, how long does the 3-way handshake take? 2. How many segments are exchanged in a typical 3-way handshake? 3. If 100 clients connect per minute, how many handshakes occur per hour? |
| 4 | 192511160 | BANDREDDY MOKSHASREE | **Scenario:** A company uses a UDP-based DNS server. **Parameters**: DNS response time, loss rate, retries **Questions**:   1. If the average DNS response time is 50 ms and retry occurs after 1s, what is total delay after 2 retries? 2. If 1% of DNS requests fail, how many of 10,000 are dropped? 3. What is the total header overhead for 10,000 queries (each 8-byte UDP header)? |
| 5 | 192572085 | CHAKALI MANOJ | **Scenario:** A cloud provider uses congestion control for large data transfers via TCP. **Parameters**: Congestion window, MSS, RTT **Questions**:   1. If cwnd = 10 MSS and MSS = 1460 bytes, how many bytes are sent per RTT? 2. If RTT = 100 ms, what is throughput (in Mbps)? 3. If cwnd doubles every RTT, how many RTTs until cwnd reaches 80 MSS? |
| 6 | 192524260 | CHILLA PAVANI | **Scenario:** An ISP implements RED (Random Early Detection) to prevent congestion. **Parameters**: Average queue size, drop probability, thresholds **Questions**:   1. If average queue exceeds max threshold of 50 packets, what is drop probability? 2. If min threshold is 20 and current queue = 35, calculate drop probability (assume linear scale). 3. If 10% of packets are dropped and arrival rate = 1000 pps, how many packets are dropped per sec? |
| 7 | 192525115 | CHINNA THUMBALAM MOHAMMED UBED | **Scenario:** A real-time multiplayer game uses UDP to minimize latency. **Parameters**: Packet delay, jitter, packet loss **Questions**:   1. If one-way delay = 30 ms and jitter = 5 ms, what is max delay? 2. If packet loss = 3%, how many lost in 10,000 packets? 3. What is the transmission delay for 500-byte packet over 1 Mbps link? |
| 8 | 192511139 | DHANSHIKA R A | **Scenario:** A banking system uses TLS 1.3 for secure communication. **Parameters**: Handshake size, encryption overhead, RTT **Questions**:   1. If TLS handshake requires 1 RTT and RTT = 150 ms, what is connection time? 2. If encryption adds 100 bytes to each 1000-byte message, what is overhead percentage? 3. For 10 encrypted sessions, how much total encryption overhead in bytes? |
| 9 | 192521216 | DHARSHAN SRINATH S | **Scenario:** A data center uses a single server queue to handle file download requests. **Parameters**: Arrival rate λ = 10/s, Service rate μ = 20/s **Questions**:   1. What is the traffic intensity (ρ)? 2. What is the average number of requests in system (L)? 3. What is average time a request spends in system (W)? |
| 10 | 192525228 | DUNNAPOTHULA NAGA BABU | **Scenario:** A cloud load balancer distributes requests across 4 servers (M/M/4). **Parameters**: λ = 50/s, μ = 20/s **Questions**:   1. What is total service rate? 2. What is system utilization ρ? 3. If one server fails, what is new service rate and utilization? |
| 11 | 192511164 | FURTHOSE SAMREEN S | **Scenario:** A VoIP server uses priority queuing for voice and data traffic. **Parameters**: Voice = High Priority, Data = Low Priority **Questions**:   1. If 70% traffic is voice and served first, what risk is posed to data packets? 2. If voice traffic uses 2 Mbps, data 3 Mbps, and total bandwidth is 4 Mbps, is it sufficient? 3. If voice packet delay must be ≤ 50 ms, what should be queue size for voice at 64 Kbps? |
| 12 | 192525082 | GANGAVARAPU ABHINAY REDDY | **Scenario:** A sensor network uses a network of queues for event processing. **Parameters**: 3 nodes in series, each with λ = 10/s, μ = 15/s **Questions**:   1. What is total end-to-end delay assuming independence? 2. What is average queue length at each node? 3. What is total queue length for the system? |
| 13 | 192511093 | JANANI SRI R | **Scenario:** A satellite uses QUIC protocol for fast communication. **Parameters**: RTT = 500 ms, loss rate = 1%, handshake optimization **Questions**:   1. If QUIC handshake takes 0-RTT, what is effective connection setup time? 2. How many packets are lost out of 1000 sent? 3. If retransmission timeout is 1s, how much delay for 5 lost packets? |
| 14 | 192524224 | K BHASHITHA | **Scenario:** A video platform applies QoS for three traffic types: video, audio, data. **Parameters**: Bandwidth = 100 Mbps, Priority ratios: Video=50%, Audio=30%, Data=20% **Questions**:   1. How much bandwidth is allocated to each type? 2. If video demand spikes to 80 Mbps, what happens to others? 3. How many 5 MB video files can be transferred per second in allocated bandwidth? |
| 15 | 192511125 | K RITHIKA | **Scenario:** A TLS 1.3 server supports 1000 simultaneous connections. **Parameters**: 3 KB/session for handshake **Questions**:   1. What is total handshake data for 1000 sessions? 2. If link = 100 Mbps, how long to transfer total handshake data? 3. What is bandwidth required per session? |
| 16 | 192512093 | KAMALI S I | **Scenario:** A QUIC-enabled mobile app connects to 5 servers. **Parameters**: 0-RTT, Bandwidth estimation, Congestion control **Questions**:   1. If each QUIC connection transfers 1 MB in 2 seconds, what is average throughput per server? 2. What is total bandwidth used across all 5 servers? 3. If congestion window grows exponentially and starts at 10 KB, how many RTTs until it reaches 80 KB? |
| 17 | 192525075 | KOTHAKOTA RAKESH | **Scenario:** A VPN over TCP connects users across a congested WAN. **Parameters**: RTT = 100 ms, cwnd = 20 KB, MSS = 1000 B **Questions**:   1. How many segments are in flight per RTT? 2. What is the effective throughput? 3. If delay doubles due to congestion, what is new throughput? |
| 18 | 192524247 | KUNATI SAI LIKHITH | **Scenario:** An e-commerce platform uses TLS over HTTP/2. **Parameters**: Handshake cost, latency reduction, parallel streams **Questions**:   1. If TLS adds 250 ms latency and HTTP/2 reduces latency by 30%, what is net latency? 2. If 10 streams are multiplexed in 1 connection, how many TCP connections are saved? 3. If each stream transmits 500 KB, what is total data sent? |
| 19 | 192524071 | LATISHA S | **Scenario:** A smart grid uses priority queues to manage control and billing data. **Parameters**: Arrival rate control = 5/s, billing = 10/s; μ = 20/s **Questions**:   1. What is total traffic intensity? 2. If control has strict priority, what is average waiting time for billing queue? 3. What happens to billing if control queue becomes full? |
| 20 | 192565040 | LOGESHWARI S | **Scenario:** A DNS-over-QUIC setup is deployed to reduce latency. **Parameters**: UDP vs QUIC handshake, RTT, retry limits **Questions**:   1. If QUIC eliminates 1 RTT, and RTT = 80 ms, what is latency saving per session? 2. If retry occurs after 500 ms and failure rate = 2%, how much delay is added in 100 sessions? 3. What is the total time for 100 successful + 5 failed queries? |
| 21 | 192521170 | LOKESH KUMAR V | **Scenario:** A hospital uses UDP to send sensor data to cloud in real time. **Parameters**: 1000 sensors, 512-byte packets, 1 packet/sec **Questions**:   1. What is total bandwidth used? 2. What is header overhead if each UDP+IP header = 28 bytes? 3. How many packets are lost in 2% error environment? |
| 22 | 192525107 | M HEMANTH KUMAR | **Scenario:** A CDN edge server maintains 2000 simultaneous TCP connections. **Parameters**: Buffer = 1 MB, MSS = 1460 B **Questions**:   1. How many total MSS-sized segments can be stored in buffer? 2. If average RTT = 50 ms, what is max throughput with cwnd = 10 MSS? 3. How much buffer per connection is allocated? |
| 23 | 192511178 | MOHAMED SYED THOWFIQ S | **Scenario:** A video conferencing system uses QUIC + Forward Error Correction (FEC). **Parameters**: Loss = 5%, Packet size = 1000 B, FEC adds 20% **Questions**:   1. What is actual packet size with FEC? 2. For 10,000 packets, how many redundancy packets are sent? 3. What is total overhead in MB? |
| 24 | 192521220 | MOHAMMAD ALEYAS | **Scenario: A** single TCP server is serving 800 clients/hour. **Parameters**: Avg request = 500 KB, RTT = 100 ms **Questions**:   1. What is total data served per hour? 2. What is minimum bandwidth required to serve all clients in 1 hour? 3. What is average throughput per client? |
| 25 | 192511188 | MOUNNILA S P | **Scenario:** A data stream passes through 3 priority queues (Voice, Video, Data). **Parameters**: Rates: Voice=2 Mbps, Video=5 Mbps, Data=10 Mbps; link = 15 Mbps **Questions**:   1. Which class faces starvation? 2. If priority-based fair queuing is applied, what is fair share for each? 3. If only voice is transmitted, what is utilization percentage? |
| 26 | 192525059 | MUSTURI BALAJI | **Scenario:** A QUIC client maintains connection state in 0-RTT mode. **Parameters**: 100 clients, each send 1 KB state **Questions**:   1. What is total state info sent in bytes? 2. If RTT is saved per client (100 ms), what is cumulative time saved? 3. If retransmission rate is 5%, how many clients need resend? |
| 27 | 192572086 | NITYA PRIYA P M | **Scenario:** A multi-server model (M/M/3) is used in a cloud router. **Parameters**: λ = 45 req/s, μ = 20 req/s **Questions**:   1. What is system utilization? 2. Is the system stable? 3. What is total service capacity? |
| 28 | 192524244 | NUHA FATHIMA H | **Scenario:** A data center uses M/M/1 queuing for logging system. **Parameters**: λ = 9/s, μ = 10/s **Questions**:   1. What is average number of logs in system (L)? 2. What is average delay per log (W)? 3. What is probability server is idle? |
| 29 | 192524072 | PRASHANTH G | **Scenario:** A TLS 1.3 handshake is optimized for IoT devices. **Parameters**: 200 devices, 500 bytes handshake **Questions**:   1. What is total handshake data size? 2. If network rate = 1 Mbps, how long to complete handshake? 3. What is time per device? |
| 30 | 192525231 | PRATTIPATI HASINI | **Scenario:** A QUIC client supports up to 4 parallel streams. **Parameters**: Each stream = 1 MB, RTT = 100 ms **Questions**:   1. How much data is transferred in 4 streams? 2. If transfer takes 400 ms, what is throughput? 3. If RTT drops to 50 ms, what is new throughput? |
| 31 | 192524267 | RIFA FATHIMA S | **Scenario:** A secure video app uses TLS 1.3 + QUIC over Wi-Fi. **Parameters**: Latency = 30 ms, Packet size = 1500 B, Overhead = 5% **Questions**:   1. What is size of overhead per packet? 2. How much overhead for 1 GB transfer? 3. What is effective payload? |
| 32 | 192511104 | S LEKHA | **Scenario:** TCP NewReno is used over a lossy satellite link. **Parameters**: Loss = 10%, RTT = 600 ms, MSS = 1 KB **Questions**:   1. How many packets lost in 1000? 2. What is expected throughput using TCP throughput formula? 3. What is retransmission delay? |
| 33 | 192525222 | SAKA CHANDRA SIDDHARDHA | **Scenario:** TCP vs QUIC performance comparison on mobile. **Parameters**: TCP = 1.5 RTT handshake, QUIC = 0-RTT **Questions**:   1. If RTT = 120 ms, what is connection time difference? 2. How many packets are saved in QUIC? 3. What is time saved over 100 connections? |
| 34 | 192511172 | SAMRAKSHINI G | **Scenario:** A multi-server queue handles payment requests. **Parameters**: 5 servers, λ = 100/s, μ = 30/s **Questions**:   1. What is total service rate? 2. What is utilization? 3. If 1 server is added, what is new utilization? |
| 35 | 192521169 | SARATH B | **Scenario:** A firewall drops 0.5% of TLS packets. **Parameters**: 100,000 packets sent **Questions**:   1. How many are dropped? 2. If 2 retransmissions allowed, how many retry packets are sent? 3. What is drop-adjusted delivery rate? |
| 36 | 192521204 | SHAROON STONE M | **Scenario:** A real-time app prioritizes control messages. **Parameters**: Control rate = 2/s, Data rate = 10/s, μ = 15/s **Questions**:   1. What is average system load? 2. What is expected waiting time for control? 3. What happens if μ drops to 12/s? |
| 37 | 192572096 | SHRAAVANI N | **Scenario:** QUIC uses connection ID for mobility. **Parameters**: ID = 64 bits, 1 million users **Questions**:   1. How many unique IDs are possible? 2. Is 64 bits enough for global uniqueness? 3. What is probability of collision? |
| 38 | 192525060 | SYED ARSHAD | **Scenario:** A TLS 1.3 tunnel encrypts data with AES overhead. **Parameters**: Overhead = 16 bytes/packet, Packet size = 1024 B **Questions**:   1. What is total size per packet after encryption? 2. For 1 million packets, what is total overhead? 3. What is the overhead percentage? |
| 39 | 192572091 | TALARI VISHNUVARDHAN | **Scenario:** Network-of-Queues in 4-tier application architecture. **Parameters**: λ = 30/s, μ1=μ2=μ3=μ4=40/s **Questions**:   1. What is per-node utilization? 2. What is total system delay assuming independence? 3. What is probability of delay > 100 ms? |
| 40 | 192524236 | THANUSHREE P | **Scenario**:A server supports TLS 1.3 over QUIC with priority queues. **Parameters**: Voice (high), File (low), Shared link = 10 Mbps **Questions**:   1. How much bandwidth should be reserved for voice to guarantee ≤50 ms latency? 2. If file transfer needs 2 Mbps, is remaining bandwidth sufficient? 3. What queuing model fits this system? |