K.S.R. COLLEGE OF ENGINEERING (Autonomous)

Vision of the Institution

- We envision to achieve status as an excellent educational institution in the global knowledge hub, making self-learners, experts, ethical and responsible engineers, technologists, scientists, managers, administrators and entrepreneurs who will significantly contribute to research and environment friendly sustainable growth of the nation and the world.

Mission of the Institution

- To inculcate in the students self-learning abilities that enable them to become competitive and considerate engineers, technologists, scientists, managers, administrators and entrepreneurs by diligently imparting the best of education, nurturing environmental and social needs.
- To foster and maintain a mutually beneficial partnership with global industries and Institutions through knowledge sharing, collaborative research and innovation.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Vision of the Department

- To create ever green professionals for software industry, academicians for knowledge cultivation and researchers for contemporary society modernization.

Mission of the Department

- To produce proficient design, code and system engineers for software development.
- To keep updated contemporary technology and fore coming challenges for welfare of the society.

Programme Educational Objectives (PEOs)

PEO1 : Figure out, formulate, analyze typical problems and develop effective solutions by imparting the idea and principles of science, mathematics, engineering fundamentals and computing.

PEO2 : Competent professionally and successful in their chosen career through life-long learning.

PEO3 : Excel individually or as member of a team in carrying out projects and exhibit social needs and follow professional ethics.

K.S.R. COLLEGE OF ENGINEERING (Autonomous)

Department of Computer Science and Engineering

Subject Name: HIGH SPEED NETWORKS
Subject Code: 16CS765 Year/Semester:IV / VII

Course Outcomes: On completion of this course, the student will be able to

CO1 Understand the basics of high speed networking technologies.
CO2 Demonstrate the knowledge of network planning and optimization.
CO3 Apply the concepts learnt in this course to optimize performance of high-speed networks.
CO4 Design and configure networks to support a specified set of applications.
CO5 Understand the concept of protocols and create new protocols for supporting of QoS.

Program Outcomes (POs) and Program Specific Outcomes (PSOs)

A. Program Outcomes (POs)

Engineering Graduates will be able to :

PO1 **Engineering knowledge:** Ability to exhibit the knowledge of mathematics, science, engineering fundamentals and programming skills to solve problems in computer science.

PO2 **Problem analysis:** Talent to identify, formulate, analyze and solve complex engineering problems with the knowledge of computer science. .

PO3 **Design/development of solutions:** Capability to design, implement, and evaluate a computer based system, process, component or program to meet desired needs.

PO4 **Conduct investigations of complex problems:** Potential to conduct investigation of complex problems by methods that include appropriate experiments, analysis and synthesis of information in order to reach valid conclusions.

PO5 **Modern tool Usage:** Ability to create, select, and apply appropriate techniques, resources and modern engineering tools to solve complex engineering problems.

PO6 **The engineer and society:** Skill to acquire the broad education necessary to understand the impact of engineering solutions on a global economic, environmental, social, political, ethical, health and safety.

PO7 **Environmental and sustainability:** Ability to understand the impact of the professional engineering solutions in societal and Environmental contexts and demonstrate the knowledge of, and need for sustainable development.

PO8 **Ethics:** Apply ethical principles and commit to professional ethics and responsibility and norms of the engineering practices.

PO9 **Individual and team work:** Ability to function individually as well as on multi-disciplinary teams.

PO10 **Communication:** Ability to communicate effectively in both verbal and written mode to excel in the career.

PO11 **Project management and finance:** Ability to integrate the knowledge of engineering and management principles to work as a member and leader in a team on diverse projects.

PO12 **Life-long learning:** Ability to recognize the need of technological change by independent and life-long learning.

B. Program Specific Outcomes (PSOs)

PSO1 Develop and Implement computer solutions that accomplish goals to the industry, government or research by exploring new technologies.

PSO2 Grow intellectually and professionally in the chosen field.

UNIT-01

HIGH SPEED NETWORKS

PART-A

1. What is ATM?[MAY/JUNE-2012]*(Remembering)*

Asynchronous Transfer Mode (ATM) is a method for multiplexing and switching that supports a broad range of services. ATM is a connection-oriented packet switching technique that generalizes the notion of a virtual connection to one that provides quality-of-service guarantees.

2. What are the main features of ATM?*Creating)*

- The service is connection-oriented, with data transfer over a virtual circuit.
- The data is transferred in 53 byte packets called cells.
- Cells from different VCs that occupy the same channel or link are statistically multiplexed.
- ATM switches may treat the cell streams in different VC connections unequally over the same channel in order to provide different qualities of services (QOS).

3. What are the layers/plane of BISDN reference model?(*Creating)*

- User plane.
- Control plane.
- Layer management plane.
- Plane management plane.

4. Define MPLS?*(Applying)*

Multi Protocol Label Switching is to standardize a label switching paradigm that integrates layer 2 switching with layer 3 routing. The device that integrates routing and switching functions is called a Label Switching Router (LSR).

5. What is called frame relay?*(Understanding)*

Frame relay is a connection oriented data transport service for public switched networks. The frame relay protocols are modification of X.25 standards.

6. What are the advantages of DQDB MAC protocol?*Creating)*

- It is very efficient
- There is no loss of capacity due to collision
- The head station continuously generates an idle frame

7. Define VPI & VCI*(Understanding)*

The Virtual Path Identifier (VPI) constitutes a routing field for the network while the Virtual Channel Identifier (VCI) is used for the routing to and from the end user.

8. Mention the High Speed LANs(*Creating)*

- Fast Ethernet
- Gigabit Ethernet
- Fibre Channel
- High Speed Wireless LANs.

9. What are the requirements for wireless LANs?[]MAY/JUNE-2014*(Remembering)*

- Throughput
- Number of nodes
- Service Area
- Battery Power
- Handoff/roaming
- Dynamic Configuration.

10. What are the types of Ethernet?*(Understanding)*

- Classical Ethernet
- Fast Ethernet
- 10Mbps Ethernet
- Gigabit Ethernet
- 10-Gpbs Ethernet.

11. Define VPN.*(Creating)*

MPLS provides an efficient mechanism for supporting Virtual Private Network (VPNs).With a VPN, the traffic of a given enterprise or group passes transparently through an internet providing performance guarantees and security.

12. Define ISDN?*(Creating)*

The integrated services digital network is to provide a unique user network Interface (UNI) for the support of the basic set of narrow band (NB) services that is voice and low speed data thus providing a narrowband integrated access.

13. What are the features of an ISDN?*(Applying)*

- Standard user network interface (UNI).
- Integrated digital transport.
- Service integration.
- Intelligent network services.

14. What are the services of LAPD?*(Understanding)*

- Acknowledgement information transfer service.
- Unacknowledgement information transfer service.

15. Define frame relay.*(Understanding)*

A form of packet switching based on the use of variable-length link-layer frames. There is no network layer, and many of the basic functions have been streamlined or eliminated to provide for greater throughput.

16. What are the traffic parameters of connection-oriented services?*(Remembering)*

- Peak Cell Rate (PCR)
- Sustained Cell Rate (SCR)
- Initial Cell Rate (ICR).
- Cell Delay Variation Tolerance (CDVT).
- Burst Tolerance (BT).
- Minimum Cell Rate (MCR).

17.What are the quality service (QoS) parameters of connection-oriented services?*(Applying)*

- Cell Loss Ratio (CLR).
- Cell Delay Variation (CDV).
- Peak-to-Peak Cell Delay Variation (Peak-to-Peak CDV).
- Maximum Cell Transfer Delay (Max CTD).
- Mean Cell Transfer Delay (Mean CTD).

18. Types of delays encountered by cells*(Understanding)*

- Packetization delay (PD) at the source.
- Transmission and propagation delay (TD).
- Queuing delay (QD) at each switch.
- Affixed processing delay (FD) at each switch.
- A jitter compression or depacketization delay (DD) at the destination.

19.What is the datalink control functions provided by LAPF?*(Applying)*

- Frame delimiting, alignment & transparency.
- Frame multiplexing/demultiplexing using the address field.
- Inspection of the frame to ensure that it consist of an integer no. of octets prior to zero bit insertion or following zero bit extraction.
- Inspection of the frame to ensure that it is neither too long nor too short.
- Detection of transmission errors.
- Congestion control functions.

20.Difference b/w AAL ¾ & AAL 3/5.*(Applying)*

AAL 3/4	AAL 3/5
➢ n this MID field is used to multiplex diff streams of data on the same virtual ATM connection. ➢ 10 bit CRC is provided for each SAR PDU. ➢ n this 8 ATM octets per AAL SDU, 4 octets per cell.	➢ n this MID field is assumed to that the higher layer software takes care of such multiplexing. ➢ 32 bit CRC protects the entire cpu's PDU, provides strong protection against bit errors. ➢ octets per AAL SDU, 0 octets per ATM cell.

21. What are the principles of ISDN ?*(Remembering)*

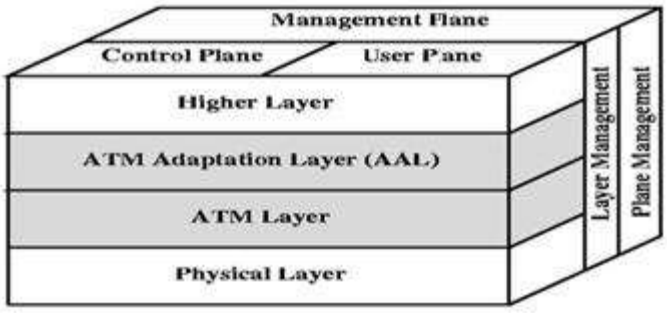
- Support voice and non-voice communication.
- Support switched and non switched application.
- Reliance on 64Kbps connection.
- Intelligence in the network.

22. Difference b/w Frame relay and X.25 packet switching. *(Applying)*

Frame Relay	X.25 Packet Switching
➢ End to End flow and error control.	➢ op by Hop flow and error control.
➢ multiplexing and switching operations are carried out in layer 2(Data link layer).	➢ multiplexing and switching operations are carried out in layer 3(network layer).
➢ common Channel Signalling.	➢ nband Signalling

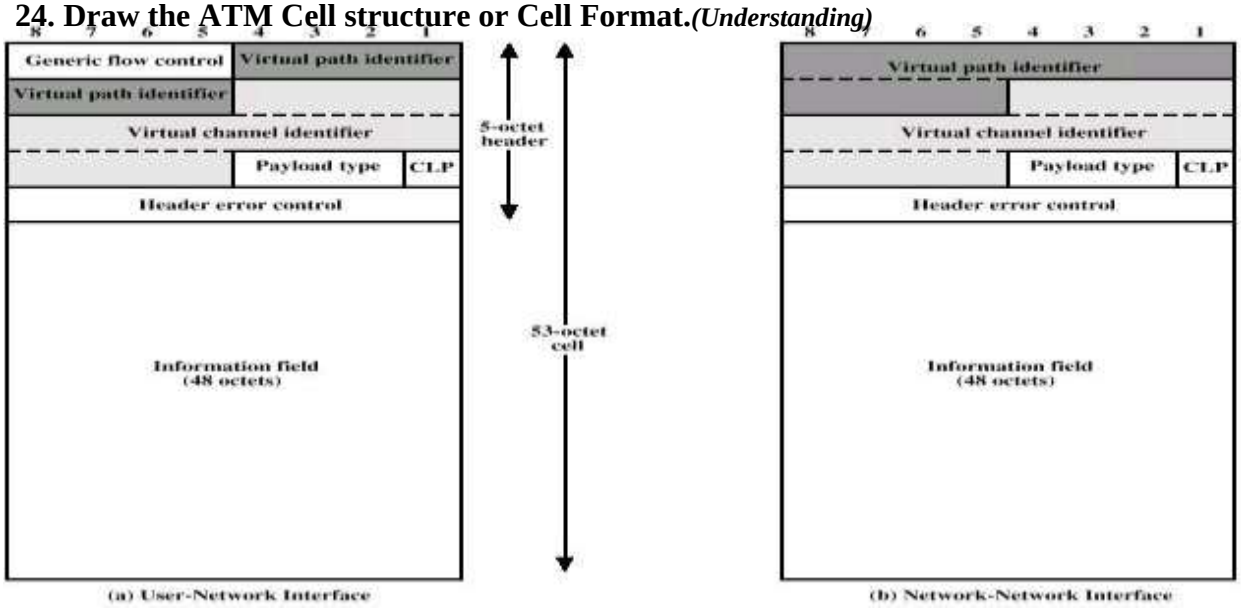
- data rate -2Mbps.
- data rate -64Mbps.

23. Give the neat sketch of ATM Protocol Architecture. ***(Understanding)***



ATM Protocol Architecture

24. Draw the ATM Cell structure or Cell Format. ***(Understanding)***



PART-B

1. Discuss the various ATM service categories.[MAY/JUNE-2015,2013]***(Remembering)***
2. Explain the ATM Protocol architecture with a neat block diagram.***(Understanding)***
3. Explain the Frame Relay Networks with suitable diagram.***(Applying)***
4. Draw IEEE 802.11 architecture and Protocol architecture.***(Understanding)***
5. Discuss the relevance of CSMA/CD in gigabit ethernets.***(Remembering)***
6. Explain in detail about Fiber Channel.***(Understanding)***

UNIT-02
CONGESTION AND TRAFFIC MANAGEMENT

PART-A

1. What are the queuing models?*Creating)*

Two types of queing models are ,

- Single server queue.
- Multi server queue.

2. Why Congestion Occurs in the networks?*(Applying)*

The phenomenon of congestion is a complex one, as in the subject of congestion control, congestion noccurs when the number of packetsb being transmitted through a network begins to approach the packet handling capacity of the network.

3. What is meant by the term congestion in networks?[MAY/JUN-2013]*(Remembering)*

The objective of the congestion control is to maintain the number of packets within the network is known as congestion in the network.

4. State Kendall's notation.[APR/MAY-2011,NOV/DEC-2013]*(Creating)*

Kendall's notation is X/Y/N, where X refers to the distribution of the interarrival times, Y refers to the distribution of service times, and N refers to the number of servers. The most common distributions are denoted as follows:

G = General distribution of interarrival times or service times
GI = General distribution of interarrival times with the restriction that Interarrival times are independent.
M = Negative exponential distribution
D = Deterministic arrivals or fixed-length service.

Thus, M/M/1 refers to a single-server queuing model with poisson arrivals (Exponential interarrival times) and exponential service times.

5. What is meant by congestion control technique?*(Understanding)*

Congestion Avoidance: It is the procedure used at beginning stage of congestion to minimize its effort. This procedure initiated prior to or at point A. This procedure prevent congestion from progressing to point B. Techniques,

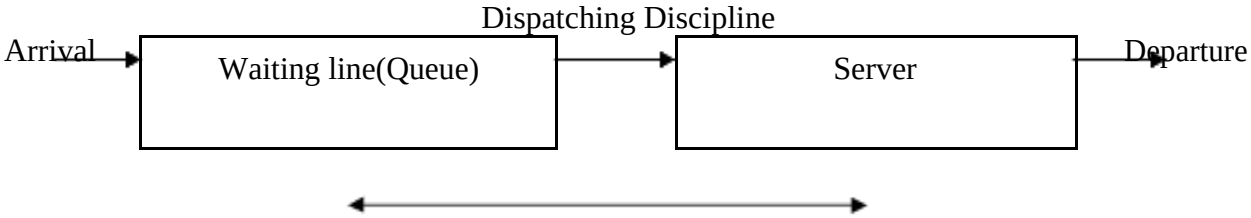
- ✓ Back pressure
- ✓ Choke packet
- ✓ Implicit congestion Signalling
- ✓ Explicit Congestion Signalling.

6. Define Backward explicit congestion notifivation?[NOV/DEC-2012]*(Creating)*

The BECN bit is part of the Address field in the Frame Relay frame header. DCE devices set the value of the BECN bit to 1 in frames traveling in the opposite direction of frames with their FECN bit set. This informs the receiving DTE device that a particular path through the network is congested.

7. What is single server queue?[MAY/JUN-2014]*(Remembering)*

The control element of the system is a server, which provides some service to items. If the server is idle an item is served immediately. Otherwise an arriving items joins awaiting line.



8. Define committed burst size (B_C)*(Understanding)*

It is defined as the maximum number of bits in a predefined period of time that the network is committed to transfer with out discarding any frames.

9. Define committed information rate (CIR)*(Understanding)*

CIR is a rate in bps that a network agrees to support for a particular frame mode connection. Any data transmitted in excess of CIR is vulnerable to discard in event of congestion.

CIR < Access rate

10. Define excess burst size (B_e)*(Creating)*

It is defined as the maximum number of bits in excess of B_C that a user can send during a predefined period of time. The network is committed to transfer these bits if there is no congestion. Frames with B_e have lower probability to transfer than frames with B_C.

11. Define access rate.*(Understanding)*

For every connection in frame relay network, an access rate (bps) is defined. The access rate actually depends on bandwidth of channel connecting user to network.

12. Write Little's formula.*(Applying)*

Little's formula is defined as the product of item arrive at a rate of λ, and Served time of items T_r (or) product of item arrive at a rate of λ and waiting time of an items T_w.

It is given as, $r = \lambda T_r$ (or) $w = \lambda T_w$

13. List out the model characteristics of queuing models.*(Understanding)*

- Item population.
- Queue size
- Dispatching discipline
- Service pattern

14. List out the fundamental task of a queuing analysis.

(*Creating)*

Queuing analysis as the following as a input information.

- Arrival rate
- Service rate
- Number of servers

Provide as output information concerning:

- ✓ Items waiting
- ✓ Waiting time
- ✓ Items queued
- ✓ Residence time

15. List out the assumptions for single serverqueues.(*Creating)*

- Poisson arrival rate.
- Dispatching discipline does not give preference to items based on service times
- Formulas for standard deviation assume first-in, first-out dispatching.
- No items are discarded from the queue.

15. List out the assumptions for Multiserver queues.*(Understanding)*

- Poisson arrival rate.
- Exponential service times
- All servers equally loaded.
- All servers have same mean service time.
- First-in, first-out dispatching.
- No items are discarded from the queue.

16. State Jackson's theorem.*(Applying)*

Jackson's theorem can be used to analyse a network of queues. The theorem is based on three assumptions:

1. The queuing network consists of m nodes, each of which provides an independent exponential service.

2. Items arriving from outside the system to any one of the nodes arrive with a poisson rate.

3. Once served at a node, an item goes (immediately) to one of the other nodes with a fixed probability, or out of the system.

18. Define Arrival rate and service rate.*(Understanding)*

Arrival Rate: The rate at which data enters into a queuing system i.e., inter arrival rate. It is indicated as λ.

Service Rate: The rate at which data leaves the queuing system i.e., service rate. It is indicated as μ.

19.How does frame relay report congestion?*(Remembering)*

When the particular portion of the network is heavily congestion. It is Desirable to route packets around rather than through the area of congestion.

PART-B

1. Explain Queuing theory.***(Applying)***
2. Explain Queuing Analysis and its types.**(*Creating)***
3. Explain Traffic Management In Congestion Control.***(Understanding)***
4. Explain the Congestion Control Mechanisms.[NOV/DEC-2012]***(Remembering)***
5. Explain how congestion avoidance is done in a frame relay networks.***(Applying)***
6. Explain the Single Server Queuing model in detail***(Remembering)***

UNIT-03
TCP AND ATM CONGESTION CONTROL

PART-A

16. 1. Define congestion.(*Creating)*

Excessive network or internetwork traffic causing a general degradation of service.

2. Define congestion control.*(Remembering)*

A method to limit the total amount of data entering the network, to amount of data that network can carry.

3. List out the TCP implementation policy option.*(Applying)*

- Send policy
- Deliver policy
- Accept policy
- Retransmit policy
- Acknowledge policy

4. List out the three retransmit strategies in TCP traffic control?*(Remembering)*

- First-only
- Batch
- Individual

5. Explain about the congestion control in a TCP/IP based internet implementation task. ***(Remembering)***

- IP is connectionless, stateless protocol that includes no provision for detecting, much less controlling congestion.
- TCP provides only end-to-end flow control and deduce the presence of congestion.
- There is no cooperative, distributed algorithm to bind together the various TCP entities.

6. list out retransmission timer management techniques[NOV/DEC-2010]*(Understanding)*

- RTT variance estimation.
- Exponential RTO back off
- Karn's algorithm.

7. Write down the window management techniques.[NOV/DEC-2013]*(Remembering)*

- Slow start.
- Dynamic window sizing on congestion.
- Fast retransmit
- Fast recovery
- Limited transmit.

8. Define binary exponential back off.(*Creating)*

A simple technique for implementing RTO backoff is to multiply the RTO for a segment by a constant value for each retransmission.

RTO = q * RTO ……. (1)

The equation causes RTO a grow exponentially with each retransmission. The most commonly used value of q is 2.

9.State the condition that must be met for a cell to conform.*(Understanding)*

In case of ATM, the information flow on each logical connection is organized into fixed-size packets called cells.

Cells should arrive with in theoretical arrive time but with in CDVT (limitation) cell is conformed.

10.What are the mechanisms used in ATM traffic control to avoid congestion condition?*(Remembering)*

- Resource management.
- Connection admission control
- Usage parameter control
- Traffic shaping

11.How is times useful to control congestion in TCP?(*Creating)*

The value of RTO (Retransmission time out) have a critical effect on TCP's reaction to congestion. Hence by calculating RTO effectively congestion can be controlled.

12.What is the difference between flow control and congestion control?*(Understanding)*

- Flow control: The transmitter should not overwhelm the receiver so flow control is performed.
- Congestion control: It aim to limit the total amount of data entering the network, to amount of data that network can carry.
-

13. What is reactive congestion control and preventive congestion control.(*Creating)*

- Reactive congestion control: Whenever a packet discard, occur due to severe congestion, some control mechanism is needed to recover from network collapse these mechanism is reactive congestion control.
- Preventive congestion control: Mechanism to avoid congestion before it occurs.

14. Why congestion control is difficult to implement in TCP?*(Remembering)*

The end system is expected to exercise flow control upon the source end system at a higher layer. Thus it is difficult to implement in TCP.

15. What are the accept policies used in TCP traffic control? (*Creating)*

Accept policy:

a). In-order policy

b). In –window policy.

16. What is meant by silly window syndrome?(*Creating)*

If frequently data's are send as small segment, the response will be speed in sender side but it cause degradation in performance. This degradation is called silly window syndrome.

17. What is meant by cell insertion time?*(Understanding)*

Cell insertion time is the time taken to insert a single cell on to the network.

18. What are the mechanisms used in TCP to control congestion? ***(Understanding)***

TCP congestion control mechanism:

a). RTO timer management b). window management

19. What is meant by open loop and closed loop control in ABR mechanism?(*Creating)*

Open loop control: If there is no feedback to the source concerning congestion, this approach is called open loop control.

Closed loop control: ABR has feedback to the source concerning congestion; this approach is called closed loop control.

20. What is meant by allowed cell rate (ACR)?*(Remembering)*

Allowed cell rate: The current rate at which source is permitted to send or transmit cell in ABR mechanism is called allowed cell rate.

21. Define Behavior Class Selector (BCS)*(Understanding)*

Behaviour Class Selector (BCS): BCS enables an ATM network to provide different service levels among UBR connections by associating each connection with one of a set of behaviour class.

22. What is cell delay variation?*(Remembering)*

In ATM cell network voice & video signals can be digitized & transmitted as a system of cells. A key requirement especially for voice is that the delay across the network be short. ATM is designed to minimize the processing & transmission overhead to the networks. So that very fast cell switching & routing is possible.

23. Why retransmission policy essential in TCP?(*Creating)*

TCP maintains a queue of segments that have been sent but not yet acknowledged. The TCP specification states that TCP will retransmit a segment. If it fails to receive an acknowledge within a given time. A TCP implement may employ one of three retransmission strategies.

(i) First only
(ii) Batch
(iii) Individual

24. Why congestion control in a tcp/ip internet is complex? (*Creating)*

The task is difficult one becoz of the following factor

(i)IP is a connectionless stateless protocol that includes no provision for detecting much less controlling congestion.

(ii)TCP provides only end-to-end flow control.

(iii)There is no co-operative distributed algorithm.

25. Write relationship b/w throughput & TCP window size 'W'. **(*Creating)***

$$S = \begin{cases} 1 & \text{for } W > RD/4 \\ 4W/RD & \text{for } W < RD/4 \end{cases}$$

Where

W → TCP window size (octets)

R → Data rate at TCP source available to a given TCP connection.

D → Propagation delay b/w TCP source & destination over a given TCP Connection.

26. Define ABR (*Creating)*

ABR is the available bit rate. ABR specifies a Peak Cell Rate (PCR) that it requires. The network allocates resources so that all ABR applications receive at least their MCR capacity. The ABR mechanism uses explicit feedback to sources to assure that capacity is facility allocated.

27. Define CBR (Constant Bit Rate)***(Understanding)***

The CBR service is perhaps the simplest to define. It is used by applications that require a fixed data rate that is continuously available during the connection lifetime & a relatively tight upper bound on transfer delay. CBR is commonly used for uncompressed audio & video information.

28. Write the examples for CBR.*(Remembering)*

- Video conferencing
- Interactive audio
- Audio/video distribution
- Audio/video retrieval

PART-B

1. Explain TCP Flow Control.***(Understanding)***
2. Explain the TCP Congestion Control with neat diagrams.**(*****Creating)***
3. Explain Retransmission and Timer Management Techniques.**(*****Creating)***
4. Explain five important techniques in window management.***(Understanding)***
5. Explain Traffic And Congestion Control in ATM and its requirements.***(Remembering)***
6. Explain the ATM traffic – related attributes.***(Applying)***
7. Explain in detail ABR traffic management.***(Remembering)***

UNIT-04
INTEGRATED AND DIFFERENTIATED SERVICE

PART-A

1. Write down the two different, complementary IETF Standards traffic management Frameworks?*(Understanding)*

- Integrated services
- Differentiated services

2. Write down the current traffic demand viewed by the IS provider?*(Understanding)*

- Limits the demand that is satisfied to that which can be handled by the current capacity of the network.
- Reserves resources within the domain to provide a particular QoS to particular portions of the satisfied demand.

3. Explain about differentiated services?(*Creating)*

A DS framework does not attempt to view the total traffic demand in any overall or integrated sense, nor does it attempt to reserve network capacity in advance. In DS framework, traffic is classified into a number of traffic groups. Each groups is labeled appropriately, and the service provided by network elements

depends on group membership, with packets belonging to different groups being handled differently.

4. What are the requirements for inelastic traffic?*(Remembering)*

- Throughput
- Delay
- Jitter
- Packet loss

5. Give some applications that come under elastic traffic.(*Creating)*

- E-Mail (SMTP) – Quite insensitive to changes in delay.
- File transfer (FTP) – The delay to be proportional to the file size and sensitive to changes in throughput.
- Network management (SNMP) – To get through with minimum delay increases with increased congestion.
- Remote Logon and Web Access (TELNET and HTTP) – These are called as Interactive applications are quite sensitive to delay.

6. State the drawbacks of FIFO queering discipline?[APR/MAY-2008]*(Understanding)*

- No special treatment is given to packets from flows that are of higher priority (or) are more delay sensitive. If a number of packets from different flows are ready to forward, they are handled strictly in FIFO order.
- If a number of smaller packets are queued behind a long packet, then FIFO Queuing results in a larger average delay per packet than if the shorter packets were transmitted before the longer packet. In general, flows of larger packets get better service.
- A greedy TCP connection can crowd out more altruistic connections.

7. Distinguish between inelastic and elastic traffic? *(Remembering)*

S.No	Elastic traffic	Inelastic traffic
1	Elastic traffic is that which can adjust , over wide ranges, to changes in delay and throughput across an internet and still meet the needs of its applications	Inelastic traffic does not easily adapt, if at all, to changes in delay and throughput across an internet.
2	Example is electronic mail(SMTP),file transfer(FTP), Web access(HTTP),Network management(SNMP)	Prime examples is real-time traffic (Voice chat, Tele conferencing)

8. Define the format of DS field?*(Understanding)*

Packets are labeled for service handling by means of the DS field, which is placed in the type of service field of an IPv4 header or the traffic class field of the IPv6 header.

RFC 2474 defines the DS field as having the following format: the leftmost 6 bits form a DS code point and the rightmost 2 bits are currently unused. The DS codepoint is the DS label used to classify packets for differentiated services.

9. Define DS code point.*(Understanding)*

A specified value of 6 bit DS code point portion of the 8 bit DS field in the IP header which indicate to which class packets belongs and its drop precedence.

10. What is meant by traffic conditioning agreement?*(Remembering)*

An agreement that specify rules that are to apply for packets selected by the classifier. Control functions performed in TCA are metering, marking, shaping and dropping.

11. Define DS boundary node.*(Remembering)*

A DS node that connects one DS domain to the node in another domain.

12. Define DS interior node.*(Remembering)*

A node in DS domain, which is not the boundary node is called DS interior node.

13. Define DS node.*(Understanding)*

A router that supports DS policies is called as DS node. A host system that uses DS for application is also called as DS node.

14. Write down the two routing mechanism use in ISA.(*Applying)*

- **Routing algorithm**- Decreases local congestion, reduces delay.
- **Packet discard**- Most recent packet is discarded, sending TCP entity back off,Reduces load.

15. List out the ISA components?*(Remembering)*

- Reservation protocol.
- Admission control
- Management agent.
- Routing protocol

16. List out the two principal functionality areas that accomplish forwarding packets in the router.*(Applying)*

- Classifier and route selection.
- Packet scheduler.

17. Define TSpec.*(Understanding)*

ISA service for a flow of packets is defined on two levels.

- A number of general categories of service are provided, each of which provides a certain general type of service guarantees.
- Within each category, the service for a particular flow is specified by the values of certain parameters.
- Together, these values are referred to as a traffic specification (TSpec)

18. List out the categories of service in ISA.(*Creating)*

- Guaranteed service
- Controlled load service
- Best effort service

19. List out the advantages of ISA.*(Understanding)*

- Many traffic sources can easily and accurately be defined by a token bucket scheme.
- The token bucket scheme provides a concise description of the load to be imposed by a flow, enabling the service to determine easily the resource requirement.
- The token bucket scheme provides the input parameters to a policing function.

20. Define delay jitter.*(Applying)*

The delay jitter is the maximum variation in delay experienced by packets in a single session.

21. What is meant by differentiated service?(*Creating)*

- It does not attempt to view the total traffic demand in integrated sense.
- It does not reserve network capacity in advance.
- It provides different level of QoS to different traffic flows.

22. What is meant by integrated service?*(Remembering)*

The IS provider

- Views the totally of current traffic demand.
- Limits the demand with respect to the current capacity handled by the network.
- Reserve resources with in the domain to provide a particular QOS guaranteed.

23. Define global synchronization.(*Creating)*

Due to packet discard during congestion, many TCP connections entered slow start at the same time. As a result, the network is unnecessarily under utilized for some time. The TCP connections which entered into slow start, will come out of slow start at about same time causing congestion again. This phenomenon is called global synchronization.

24. What are the design goals of RED algorithm?*(Remembering)*

- Congestion avoidance
- Global synchronization avoidance

PART-B

1. Explain the block diagram for Integrated Services Architecture,and give details about components.***(Applying)***
2. Explain the services offered Preferred by ISA.***(Understanding)***
3. Explain the various queuing disciplines in ISA .***(Remembering)***
4. Explain the RED algorithm .***(Applying)***
5. Explain Differentiated services briefly.**(*Creating)***
6. Write a short notes on DS per hop behaviour***(Remembering)***

UNIT-05
PROTOCOLS FOR QOS SUPPORT

PART-A

1. What is meant by soft state in RSVP?*(Remembering)*

RSVP use connectionless approach, each intermediate router maintain state information about nature of flow, that will be refreshed by end system at predetermined amount of time. This is called soft state.

2. Define session in RSVP?*(Applying)*

Once a reservation is made at a router by a particular destination, the router considers this as a session and allocates resources for the life of that session.

Session is defined by,

Session: Destination IP address
IP protocol identifier.

3.Define label switched swapping in MPLS.*(Remembering)*

The basic operation of looking up an incoming label to determine the outgoing label and forwarding is called Label Swapping.

4. What are the features of RSVP? ***(Applying)***

1. Performs resource reservations for unicast and multicast applications
2. Requests resource in one direction from a sender to a receiver
3. Requires the receiver to initiate and maintain the resource reservation.
4. Maintains soft state at each intermediate router
5. Does not require each router to be RSVP capable
6. Supports both IPv4 and IPv6.

5. Define soft state ***(Understanding)***

When a state is not refreshed within a certain timeout, the state is deleted. The type of state that is maintained by a timer is called a soft state.

6. What does RTCP provide to the sources?

(Remembering)RTCP provides:

a) Quality of service and congestion control
b) Identification
c) Session size estimation
d) Session control

7.Define The Format Of RTP Leader ***(Applying)***

V	P	X	CC	M	PLT	SQNO
TIME STAMP						

SYNCHRONIZATION SOURCE IDENTIFIERS (SSRC)
CONTRIBUTING SOURCE IDENTIFIER (CSRC)
. . . .
CSRC IDENTIFIER

e) V → Version (2 bit)
f) P → padding (1 bit)
g) X → Extension (1 bit)
h) CC → CSRC count (4 bit)
i) M → Marker (1 bit)
j) PLT → Payload type (7 bit)
k) SQNO→ sequence no. (16 bit)
l) Time Stamp → (32 bit)

8.List out the characteristics of MPLS. ***(Understanding)***

MPLS characteristics that ensure its popularity are:

a) Connection-oriented QOS support
b) Traffic engineering
c) Virtual private network(VPN) support
d) Multi protocol support

9. What is Label Stacking? ***(Remembering)***

The Stack Entries appear after the data i\link layer headers,but before network layer headers.The top of the label stack appears earliest in the packet and the bottom appears latest. The network layer follows the label packetstack entry which has the s bit set. In the

data link frame, such as for PPP, the label stack appears between trhe IP header and data link header.

10.Define QOS.*(Applying)*

It refers to the properties of a network that contributes to the degree of satisfaction that users perceive, relative to the network's performance.

11.List QOS Parameters.*(Remembering)*

- Capacity, or Data rate
- Latenc, or delay
- Jitter
- Traffic lose

12 **Define RSVP?*(Applying)***

Resource Reservation Protocol was designed as an IP signaling protocol for the integrated services model. RSVP can be used by a host to request a specific QoS resource for a particular flow and by a router to provide the requested QoS along the paths by setting up appropriate states.

13. What is meant by integrated layer processing in RTP?*(Understanding)*

In TCP/IP each layer processed sequentially, whereas in integrated layer processing, adjacent layers are tightly coupled and they function parallel.

14. What is the function of RTP relays and give its types?*(Remembering)*

A relay operating at a given protocol layer is an intermediate system that acts as both a destination and a source in a data transfer.

15. What is the function of mixer and translator in RTP?*(Remembering)*

Mixer: It is source of synchronization. It receives stream of RTP packets from one or more sources. Combines these streams and forwards a new RTP packet stream to one or more destinations.

Translator: It produces one or more outgoing RTP packets for each incoming packets. It change the format of the data that suite to transfer from one domain to another.

16.What are the resources used by an integrated service model?*(Understanding)*

Integrated service model requires resources such as bandwidth and buffers to be explicitly reserved for a given dataflow to ensure that the application receives its requested QoS

17. What do you mean by guaranteed service?*(Remembering)*

The guaranteed service in the internet can be used for applications that require real time service delivery. For this application data that is delivered to the application after a certain time is generally considered worthless. Thus guaranteed service has been designed to provide a frame bound on the end to end packet delay for a flow.

PART-B

1. Explain the Characteristics , goals of RSVP & the types of data flow***(Remembering)***
2. Explain the reservation style of the RSVP in detail.***(Applying)***
3. Explain the RSVP protocol operation and Mechanisms.***(Understanding)***
4. Explain the MLPS architecture in detail***(Remembering)***
5. Explain the RTP protocol architecture.***(Applying)***
6. Explain the RTP data transfer protocol.***(Understanding)***