DepartmentofElectronicsandCommunicationEngineeringC

CS8591– COMPUTER NETWORKs

UNITI

INRODUCTION AND PHYSICAL LAYER

1. Writedowntherequirements tobuildacomputernetwork.(April2018)

The requirements to build a computer network are Connectivity, Resource sharing and Supportforcommon services

2. Listthemetricsthatinfluencetheperformanceof thenetwork.(May16,April2018)

MetricsthatinfluencetheperformanceofthenetworkareThroghput,DelayandBandwidth

3. WhichlayerimplementsthenodetonodechannelconnectioninOSIlayeredarchitecture?(NOV2018)

Datalinklayerimplementsthenodetonodechannelconnection inOSIlayeredarchitecture

4. Definetheterms:BandwidthandLatency(Nov2017)

Bandwidth,typicallymeasuredinbits,kilobits,ormegabitspersecond,istherateatwhichdata flowsover thenetwork.

Latency, usually measured in milliseconds, is the time that elapses between a request for informationandits arrival.

5.Comparebyteorientedversesbitorientedprotocols.(Nov2017)

In abyte-orientedprotocol,datatobecarriedare8-bitcharactersfromacodingsystem.

Inabit-oriented protocol, the datasection ofa frame isa sequenceof bits. Bit-orientedprotocols are more popular today because we need to send text, graphic, audio, and video whichcan bebetter represented byabit pattern than asequenceof characters.

6. .Whatis aprotocol? Whatarethekey elementsof aprotocol? (Nov2015/Nov2021)

Protocolisthe setof rulesgoverningtheexchange of databetween twoentities.KeyelementsareSyntax:Itrefers to thestructureorformatofdatameaningtheorder inwhich theyarepresented.

Semantics:Itreferstothemeaningof eachsectionofbit.Howtodo interpretation.Timing:When data should besent and howfasttheycan besent

7. Writethe mechanismofstopandwaitprotocol.(Nov2016)

In this method of flow control, the sender sends a single frame to receiver & waits for anacknowledgment. The next frame is sent by sender only when acknowledgment of previous frame isreceived. This process of sending a frame & waiting for an acknowledgment continues as long as thesenderhasdata tosend.Toendup thetransmission sendertransmitsend oftransmission (EOT).

8. Definebitstuffing. (May2011,May2017)

HDLC denotes both the beginning and the end of a frame with the distinguished bit sequence01111110. This sequence might appear anywhere in the body of the frame, it can be avoided by bitstuffing. On the sending side, any time five consecutive 1's have been transmitted from the body of themessage,the sender inserts a 0 beforetransmitting thenext bit.

9. WhatismeantbyFlow Control?(Nov2011,May2015,May2016)

Flow control isa technique for assuring thatatransmitting entity does not overwhelm areceiving entity with data.It is a feedback mechanism by which the receiver is able to regulate thesender.Suchamechanismisusedtokeepthesenderfrom overrunningthereceiver,i.e.,fromtransmittingmoredata than the receiver is able toprocess

10. WhatisaURL?(Apr'19)

A Uniform Resource identifier, termed as a Web Addres, is a reference to a web resource thatspecifiesits location on a computer networkand a mechanism forretrieving it

11. Whatismeanbyerrorcontrol?

Errorcontrolisamethodthatcan beusedtorecoverthecorrupted datawheneverpossible.

These are two basic types of error control which are backward error control and forward errorcontrol.

12. Whatis OSI?(NovDec2019)

A standard that specifies a conceptual model called Open systems Interconnection networkinterfacemodel,whichbreaksnetworkedcommunicationsintosevenlayers:Application,Presentation,Session, Transport, Network,Data link,Physical.

13. State the major functions performed by the presentation layer of the ISO OSI model. (NovDec2006)

Presentation layer is concerned with the format of data exchanged between peers, for example,whether an integer is 16, 32, or 64 bits long and whether the most significant bit is transmitted first orlast,or how avideo stream is formatted.

14. Statethepurposeof layeringin networks?(MayJun2007)

Alayerisa collectionof relatedfunctionsthat providesservicestothelayeraboveit andreceivesservices from thelayer below it.

Toexecute thefunctionsbyeach layeris independent.

15. Whatarethetwofundamentalwaysbywhichnetworkperformanceismeasured?

1. Bandwidth
2. Latency

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UNIT-II

DATA LINK LAYER AND MEDIA ACCESS

1. Whatisa bridge?(Nov 2011,May2017)

Bridge is a hardware networking device used to connect twoLANs. A bridge operates at datalink layer of the OSI layer. A bridge observes and forwards all frames that it receives. It does forwarding& filtering frames using LAN destination address. Bridges are used to connect LAN or WAN and worksatdatalinklayerlevel.Itshouldfollowcongestioncontrol mechanismstoovercome congestion.

2. GivetheformatofEthernet format.(Dec2017,Apr19)

Preamble	Destaddr	Srcaddr	Type	Body	CRC
64	48	48	16	(variablelength)	32

3. .What detailsareprovidedby DHCPotherthan IPaddress? (NOV2018)

TheDHCPservermanagesapoolofIPaddressesandinformationaboutclientconfigurationparamet erssuch as defaultgateway,domain name,thename servers,and time servers

4. ListthedifferencebetweenPacketSwitchingandCircuit Switching.(May14,May17)

Issue	**Packetswitching**	**CircuitSwitching**
Circuitsetup	Not Required	Required
Transmissionpath	NoTransmissionpath	Dedicatedpath
Addressing	Eachpacketcontainsthefull sourceanddestinationaddress	Onlydataissent
Bandwidth	DynamicBandwidth	FixedBandwidth
Routing	Each packet is routed independently	Entiredataissentthroughthesame path
Congestioncontrol	Difficult	Easyifenoughbufferscanbelocated inadvanceforeach VCset up

5. WhatismeantbyICMP?(May2016)

ICMP stands for Internet Control Message Protocol . It isis a supporting protocol in theInternet protocol suite. It is used by network devices, including routers, to send error messages andoperational information indicating, for example, that a requested service is not available or that a hostorroutercould not bereached.

6.WhatisBluetooth?(May 2016,Nov2021)

Bluetoothisastandardfortheshort-rangewirelessinterconnectionofmobilephones,computers, and other electronic devices. Bluetooth is a wireless technology standard for exchangingdataover short distancesin therangeof10m witharate of 2Mbps.

7. Whatisscatternet?(Nov2016)

A scatternet is a type of network that isformed between two or more Bluetooth-enableddevices, such as smartphones and newer home appliances. A scatternet is made up of at least twopiconets.

8. WhenisICMPredirectmessageused?(May 2017)

An ICMPredirect isanerror message sentbyaroutertothesenderofanIPpacketRedirects are used when a router believes a packet is being routed sub optimally and it would like toinform the sending host that it should forward subsequent packets to that same destination through adifferentgateway.

9. HighlightsthecharacteristicsofDatagramnetwork.(Dec2017)

A datagram isaunitoftransferassoicatedwith networking. A datagram has thefollowing characteristics: Data is transmitted from source to destination without guarantee of delivery.Data is frequently divided into smaller pieces and transmitted without a defined route or guaranteedorderofdelivery.

10.Define802.11(May 2018)

IEEE 802.11 is a set of media access control (MAC) and physical layer (PHY) specificationsforimplementingwireless localareanetwork(WLAN)computercommunication.

11. Whatarethe limitationsofbridges?

1. Scale
2. Heterogeneity

12. DefineBluetooth.

Bluetooth is a wireless technology standard for exchanging data over short distance (usingshort-wavelength UHF radio waves in the ISM band from 2.4 to 2.485 GHz) from fixed and mobiledevicesand buildingpersonal areanetworks(PANs).

13. Whatarethe 3levels ofhierarchy inIPAddressing?

1. Netid
2. Subnetid
3. Hostid

14. Whatarethe functionsofbridge?

1. Connectingnetworks
2. Filteringinformationsothatnetworktrafficforoneportionofthenetworkdoesnotcongesttherest of the network.

15. Definesub-netting

Sub-nettingisatechniquethatallowsanetworkadministratortodivideonephysicalnetworkintosmaller logicalnetworks and thuscontrol theflowof trafficforsecurityorefficiencyreasons.

UNIT – III

NETWORK LAYER

1. WhatdoesBorderGatewayProtocol(BGP)mean?(Dec2017)

Border Gateway Protocol (BGP) is a routing protocol used to transfer data and informationbetween different host gateways, the Internet or autonomous systems. BGP is a Path Vector Protocol(PVP), which maintains paths to different hosts, networks and gateway routers and determines therouting decision based on that. It does not use Interior Gateway Protocol (IGP) metrics for routingdecisions, but only decides the route based on path, network policies and rule sets. Sometimes, BGP isdescribedas areachabilityprotocolratherthanaroutingprotocol

2. ExplainaboutOSPF. (May2018)

OSPF(OpenShortestPathFirst)isa router protocol usedwithinlargerautonomoussystem networks in preference to the Routing Information Protocol (RIP), an older routing protocolthat is installed in many of today's corporate networks.Using OSPF, a host that obtains a change to aroutingtableordetectsachangeinthenetworkimmediately multicaststheinformationtoallotherhosts in thenetwork so that all will havethe same routingtable information.

3. ExplainMulticastrouting?(May2018,Nov2021)

Multicast IP Routing protocols are used to distribute data (for example, audio/video streamingbroadcasts) to multiple recipients. Using multicast, a source can send a single copy of data to a singlemulticastaddress, whichis thendistributed to an entiregroupof recipients.

4. Givethecomparisonofunicast,multicastandbroadcastrouting.(Nov16,May17)

S.No	Unicast	Multicast	Broadcast
1.	One source and one destination	Onesourceandgroupof destinations	Onesourceandall destinations
2.	Relationshipisoneto one	Relationship is oneto many	Relationshipis oneto all

5. Whatisfragmentationandreassembly.(Nov 2016,Apr19)

Fragmentation is the process of converting the larger packet size into smaller sizes so that theywill fit into the frames of the underlying network. The receiving system reassembles the smaller sizepacketsinto theoriginalpackets.

6. WhyisIPv4toIPv6transitionrequired?(May2017)

ThemigrationfromIPv4toIPv6mustbeimplementednodebynodebyusingautoconfiguration proceduresto eliminate the need to configure IPv6 hosts manually. This way, userscanimmediately benefitfromthemany advantagesofIPv6whilemaintaining thepossibility ofcommunicating with IPv4 users.The advanatges are **More Efficient Routing, More Efficient PacketProcessing,Directed Data Flows,security.**

7. Differentiatebetweenforwardingtableandroutingtable(Dec2017)

A routing table is a representation of the Layer 3 forwarding table, based on IP. A "forwardingtable"is a moregenericterm thatcould includeLayer 2forwarding.

8. Listthetwofactorsthataffecttheperformanceof anetworkswitch.(NOV2018)

Factors that affect the performance of a network switch are- Bandwidth. Throughput. Latency,Jitterand Error rate

9. Howdoesa routerdifferfromabridge? (May2015)

Routers relay packets among multiple interconnected networks. They route packets from onenetwork to any of a number of potential destination networks on internet.A router operates as thephysical, data link and network layer of the OSI model. A router is termed as an intelligent device.Therefore,its capabilities aremuch morethan thoseof arepeaterorabridge

10. Whatarethetwomajormechanismdefinedto helptransitionfromIPV4toIPv6(Apr19).

a. DualStack:Runningboth IPv4and IPv6onthesamedevice

b. Tunneling:TransportingIPv6trafficthrough anIPv4networktransparently

c. Translation:ConvertingIPv6traffictoIpv4trafficfortransportand vice versa

11. Whatarethe3typesofroutingperformedbyBGP?

- Inter-autonomoussystemrouting
- Intra-autonomoussystemrouting
- Passthroughautonomoussystemrouting

12. Whatarethedifferentkindsof multicastrouting?

- DVMRP
- PIM
- MSDP
- MOSPF
- MBGP

13. Writethetypesof PIM.

- PIMSparsemode
- PIMDensemode
- BidirectionalPIM
- SourceSpecificMulticast(SSM)

14. Howcantheroutingbeclassified?

Therouting can beclassified as,

- Adaptiverouting
- Non-adaptiverouting.

15. Whatarethe salient featuresofIPv6?(Nov 2021)

Salientfeaturesare:

- Efficientandhierarchical addressingandroutinginfrastructures.
- IPv6networksprovideautoconfigurationcapabilities.
- BettersupportforQOS.
- LargeAddressspace.
- Statelessandstatefuladdressconfiguration.

UNIT– IVTransportLayerPARTA

1. Whatisthemain differencebetweenTCP&UDP?(Nov2014,Nov2016,Nov2021)

TCP	UDP
ItprovidesConnectionorientedservice	Providesconnectionlessservice.
ConnectionEstablishmentdelaywillbethere	Noconnection establishment delay
Providesreliableservice	Providesunreliable,butfastservice
Itis usedbyFTP, SMTP	ItisusedbyDNS,SNMP,audio,videoand multimediaapplications.

2.Definecongestioncontrol. (May2018,Nov2021)

Congestion control is the process of preventing the source from sending data that will end upgettingdropped byarouter becauseits queueis full

3. Whatismeantbyslow startinTCPcongestion?(May2016)

TCP Slow Start is part of the ***congestion control*** algorithms to help control the amount of dataflowing through to a network. It balances the speed of a network connection. Slow start graduallyincreasestheamount ofdata transmitteduntilit findsthenetwork's maximumcarryingcapacity.

4. Listthedifferentphasesusedin TCPConnection.(May2016)

ThreephasesusedinTCPConnectionare1.Connectionestablishment2.Datatransfer3. Connectiontermination

5. Whatarethe approachesused toprovideQualtyofService(QoS)? (Dec2017)

- Integratedservices ("IntServ")implementstheparameterizedapproach.Inthismodel,applications use the Resource Reservation Protocol (RSVP) to request and reserve resourcesthroughanetwork.
- Differentiated services ("DiffServ") implements the prioritized model. DiffServ marks packetsaccording to the type of service they desire. In response to these markings, routers and switchesusevarious queueingstrategiesto tailor performanceto expectations.

6. Compareflowcontrolversuscongestioncontrol.(Nov2015,Dec17)

CongestionControl	**FlowControl**
Congestioncontrolmeanspreventingthesourcfrom sendingdatathatwillendupgettin dropped byarouter becauseits queueis full.	Flowcontrolmeanspreventingthesourcefromsend ingdatathatthereceiverwillendu droppingbecauseit runs outofbuffer space.
congestioncontrolisconcernedwithhowhostsandn etworks interact.	Itisanend toanendissue
Thisismorecomplicated,becausepacketsfromdiff erentsourcestravellingdifferentpathscan convergeonthesamequeue.	Thisisfairlyeasywithaslidingwindowprotocol
Techniques • AIMD(AdditiveIncreaseMultiplicativeDecr ease) • Slowstart • Fastretransmit/Recovery.	Techniques • Stopandwait • Slidingwindow

7.WhataretheservicesprovidedbyTransportlayerprotocol.(May2018)Trans portlayerprotocolprovides

- Connectionorientedservices
- ReliableservicebyusingErrorControl and FlowControl.

Multiplexing: Transport layer performs multiplexing/demultiplexing function. Multiple applicationsemploy same transport protocol, but use different port number. According to lower layer n/w protocol,itdoes upward multiplexingor downward multiplexing

8.DefineQoS. (May2012,Nov 2014,May 2015,Nov2015 ,NOV 2018)

The quality of service defines a set of attributes related to the performance of the connection.For each connection, the user can request a particular attribute each service class is associated with asetof attributes.Theattributes are-Bandwidth,LatencyorDelay, Jitter, Packetloss ratio.

9. HowdofastretransmitmechanismofTCPworks.(May2017)

In TCP/IP, fast retransmit and recovery (FRR) is a congestion control algorithmthat makes itpossibletoquicklyrecoverlostdatapackets.WithFRR,ifareceiverreceivesadatasegmentthatisout of order, it immediately sends a duplicate acknowledgement to the sender. If the sender receivesthreeduplicateacknowledgements,itassumesthatthedatasegmentindicatedbytheacknowledgeme ntsis lost and immediatelyretransmits thelost segment.

10. How doesUDPaddressflow controlmechanism?(Apr19)

UDP does not provide any mechanism for reassembling the data in its original sequence. Thedataissimplydeliveredtotheapplicationintheorderthatitarrives.**NoFlowcontrol**-Thereareno

mechanismwithinUDPtocontroltheamountofdatatransmittedbythesourcetoavoidoverwhelmingthe destination device

11. Whatarethetypesofportnumbersusedintransportlayer?

- Well-knownport
- Registeredport
- Dynamicport

12. WhyTCPservices arecalledStreamdeliveryservices?

TCPallowsthesendingprocesstodeliverdataasastreamofbytes andthe receivingprocesstodeliverdataas astreamof bytes. So itis called asstreamof bytes.

13. Definejitter

Jitter is defined as a variation in the delay of received packets. The sending side transmits packetsin a continuous stream and spaces them evenly apart. Because of network congestion, improperqueuing,or configuration errors,thedelaybetweenpackets can varyinstead of remainingconstant.

14. Compareconnectionlessservice& connectionorientedservice

Inconnectionlessservicethereisnoconnectionbetweentransmitter&receiverEx:UDPIn connectionorientedservicethereisaconnectionbetweentransmitter&receiverEx:TCP

15. WhatisUnicast&Multicastcommunication?

- Unicastcommunicationisonesourcesendingapacket toonedestination.
- Multicastcommunicationisonesourcesendinga packettomultipledestinations.

UNIT – V
ApplicationLayer

1. Whatis DNS ? (May2018)

Domain Name System converts domain names into IP addresses so browsers can load Internetresources. It is mainly used for a memorable way of identifying hosts becauseIP numbers uniquelyidentify hosts on the Internet but are difficult to remember.. A DNS Resolver is responsible formaking requests of the local DNS server on behalf of clients. A DNS Resolver must know the IPaddressofat least one DNS server.

2. WhatdoyoumeanbyWebServicesDescriptionLanguage(WSDL)?(Dec2017)

The **WebServicesDescriptionLanguage** (**WSDL**)isanXML-based **language**usedtodescribe the **services** a business offers and to provide a way for individuals and other businesses toaccessthose**services** electronically.

3. WhatisPOP3?(Nov2016)

POP3 (Post Office Protocol 3) is the most recent version of a standard protocol for receiving e-mail. POP3 is a client/server protocol in which e-mail is received and held for you by your Internetserver

4. WhatisaURL, webbrowserandrlogin? (May2016)

- UniformResourceLocator isastringidentifierthat identifies apageon WorldWide Web.
- Webbrowserisasoftwareprogramthatinterprets anddisplaysthe contentsofHTMLwebpages.
- Remoteloginorrloginisusedtologin intoremotesystemandaccessitscontents.

5. Mentionthedifferentlevelsindomainnamespace.(May2012,16)

Domainnamespaceisdividedintothreedifferentsections:genericdomains,countrydomains&inversedomain.

- Genericdomain:Defineregisteredhostsaccordingtotheir genericbehavior,uses genericsuffixes.
- Countrydomain: Usestwo characters toidentifyacountryas the lastsuffix.
- Inversedomain:FindsthedomainnamegiventheIPaddress.

6. Whatis WWWandSMTP?(Nov 2010,May2014,May 2015)

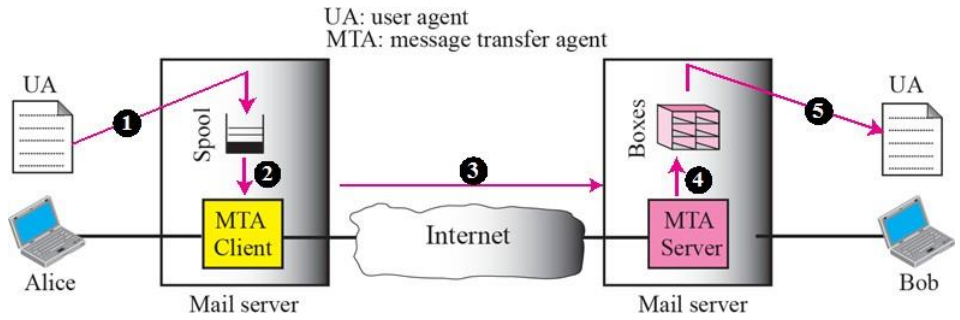
World Wide Web is an internet application that allows user to view pages and move from one webpage to another. It helps to store and share data across varied distances. The TCP/IP protocol thatsupports electronic mail on the Internet is called Simple Mail Transfer (SMTP). It is a system forsending messages to other computer users based on e-mail addresses. SMTP provides mail exchangebetweenusers on thesameor different computers.

7. Whatistheuseof SNMPprotocol inanetwork?(NOV2018)

SimpleNetworkManagementProtocol(**SNMP**)isan"Internet-standardprotocolformanaging devices on IP networks and for modifying that information to change device behavior..Devices that typically support SNMP include routers, switches, servers, workstations, printers, &modem. It is used mostly in network management systems to monitornetwork-attached devices forconditionsthat warrant administrativeattention.

8. Drawthescenarioof ElectronicMail.(Apr19)

E-mail (electronic mail) is the exchange of computer-stored messages by telecommunication.Email messages are usually encoded in ASCIItext. The architecture of the email system consists oftwo kinds of subsystems: the user agents, which allow people to read and send email, and the messagetransfer agents, which movethemessagesfrom thesourceto thedestination.



9. WhatispersistentHTTP.(Nov2016)

HTTP persistent connection, also called HTTP keep-alive, or HTTP connection reuse, is theideaofusingasingleTCPconnectiontosendandreceivemultipleHTTPrequests/responses, asopposed to opening a new connection for every single request/response pair. Thenewer HTTP/2protocolusesthesameideaandtakesitfurthertoallowmultipleconcurrentrequests/responsesto bemultiplexed over asingleconnection.

10. WritetheuseofHyperTextTransfer Protocol(HTTP).(Dec2017,May2018))

The browser **uses HTTP**, which is carried over TCP/IP to communicate to the server andretrieve Web content for the user. **HTTP** is a widely used **protocol** and has been rapidly adopted overthe Internet becauseof its simplicity.It is astateless and connectionless**protocol**.

11. Namethefouraspectsofsecurity.

- Privacy
- Authentication
- Integrity
- Non-repudiation

12. WhatisPOP?

Post Office Protocol, version3 (POP3) and Internet Mail Access Protocol version4m(IMAP4)areprotocol used byamail server inconjunction with SMTP to receive andhold mailforhosts.

13. Whatisthefunctionof SMTP?

The TCP/IP protocol supports electronic mail on the Internet is called Simple Mail Transfer(SMTP). It is a system for sending messages to other computer users based on email addresses. SMTPprovidesmail exchangebetween users on thesameor differentcomputers.

14. HowdoesMIMEenhanceSMTP?

MIMEisasupplementaryprotocolthatallowsnon-ASCIIdata tobesent throughSMTP.

MIME transforms non-ASCII data at the sender site to NVT ASCII data and deliverers it to theclient SMTP to be sent through the Internet. The server SMTP at the receiving side receives the NVTASCIIdata and delivers itto MIME to be transformingfeed back to theoriginaldata.

15. WhyisanapplicationsuchasPOPneededforelectronic messaging?

WorkstationsinteractwiththeSMTPhost,whichreceivesthemailonbehalfofeveryhostintheorganization,toretrievemessagesbyusingaclient-serverprotocolsuchasPostOfficeProtocol,version 3(POP3). Although POP3 is used to download messages from the server, the SMTP client stillneededonthe desktoptoforward messagesfrom theworkstationuser toitsSMTP mailserver.

UNITI
IntroductionandPhysicallayer

16. Explainindetailmethodoferrordetectionanderrorcorrection. **(May15,Nov17,April18,Nov2021)**
17. DiscussindetailaboutthelayersinOSImodel.**(Nov16,Nov2017,Apr18,Nov2021**)
18. Outlinethestepsinvolvedinbuildingacomputernetwork.Givethedetaileddescription for each step.**(May2017,Nov2017)**
19. Explain the layers of TCP/IP (or) Internet architecture in detail**. (April/May15,April/May17)**
20. ExplainLinkLayerAddressingandARPPacketformat**(ND17,AM18)**
21. ExplainandPresenttheevolutionandthetypesofNetworks(**ND21)**

UNIT-II
Data link layer and MediaAccess

10. DiscussindetailabouttheEthernet.**(May2012,Nov2015,May2017,May2018,ND21)**
11. WithaneatsketchexplainaboutIPservicemodel,packetformat,fragmentationandreassembly**.(Nov2016,ND21)**
12. Explain the error reporting using ICMP protocol. How does Traceroute programmakes use of ICMP to determine the name and addresses of the routers betweensourceanddestination?**(NOV2018)**
13. OutlinetheworkingprincipleofBluetoothtechnology**(Apr19)**
14. Give the comparison between different wireless technologies? Enumerate 802.11protocolstackindetail**(May2016)**
15. AnalyzethevariousPhasesinMobileIP.

UNIT–III
Network layer

16. DiscussaboutLink-stateroutingandrouters.**(Dec2017)**/Explainindetailtheoperationof OSPFprotocolbyconsideringasuitablenetwork.(Nov2016**May2017,ND21)**
17. BrieflyexplaintheBorderGatewayProtocolusedforInterdomainroutinginternetwork.**(NOV2018)**

18. ExplainaboutIPV6.CompareIPV4andIPV6.**(May2016)(May2018)ND21**
19. Explain the Routing Information protocol/Distance vector routing in detail. **(May2018)**
20. Explain working of Protocol Independent Multicast (PIM) indetail**.(May17,May18)**
21. Discusstheroleofmulticastroutinganditsrelativemerits.**ND21**

UNIT– IV
TransportLayer

16. ElaborateonTCPCongestioncontrolmechanisms.Differentiatethesemechanisms**(May2016,Nov2016,May2018)**
17. ExplainthreewayofconnectionterminationinTCPusingstatetransitiondiagram .**(NOV2018)**
18. .Write a detailed note on congestion avoidance mechanisms used in TCP.**(Dec2017,ND2021)**
19. Explainthedifferentiatedservicesoperationof QoSindetail**(May2017)**
20. Summarizethefollowing:(i)Stop-and-WaitProtocol(ii)Go-Back-NProtocol

UNIT– V
ApplicationLayer

d. DiscusstheworkingofEMailindetail**(May2015,May 2018,ND2021)**
e. BrieflyexplaintheDomainNameServiceprotocolwithanexample **(DEC17/NOV2018)**
f. ExplainindetailaboutSNMPmessages**(Nov2016,DEC17)**
g. ExplainindetailaboutHTTPoperation**(Apr19,ND2021)**
h. DiscussaboutClientServerProgramming
i. ExplainthebasicsofIMAPandPOP3 mailaccessProtocols**(Apr19)**