Registration No.: .....

A

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Computing Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, 3rd Semester,

2nd In-Sem. Examination

Course Code: ITN1302 **Time: 1 Hour**

Course Name: Wireless Networks **Max. Marks: 20**

Instructions: Answer all the questions.

Section – A

05X01 = 05 Marks

1. Which type of switching uses the entire capacity of a dedicated link?

A. Circuit switching
B. Datagram packet switching
C. Virtual circuit packet switching
D. Message switching

2. In ..., each packet of a message follows the same path from sender to receiver.

A. Circuit switching
B. Message switching
C. Virtual approach to packet switching
D. Datagram approach to packet switching

3. The processes that keep track of hosts whose home is in the area, but who currently visiting another area is .....

A. Home agent
B. Mobile agent
C. Foreign agent
D. User agent

4. Sending a packet to all destinations simultaneously is called .....

A. Multicasting
B. Unicasting
C. Telecasting
D. Broadcasting

5. The network in which all the nodes are symmetric and there is no central control or hierarchy is

.....

A. MANET
B. Client -Server Technology
C. Peer-to-Peer
D. None of these

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Section – B

03X02 = 06 Marks

Q.6 What does Wi-Fi stand for?

Q7. How can I improve my Wi-Fi latency?

Q8. Is Wi Fi the same as internet?

Section – C

03X03 = 09 Marks

Q9. Bluetooth Is Called A Cable Replacement Technology. Explain.

Q10. Which Technology Is Used To Avoid Interference In Bluetooth?

Q11. What Is The Differentiate Between CDMA And FDMA ?

Answer Key

A

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Computing Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, 3rd Semester,

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C. Peer-to-Peer
D. None of these

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Section – B

03X02 = 06 Marks

Q.6 What does Wi-Fi stand for?

Ans. IEEE is a separate, but related, organization and their website has stated '**WiFi** is a short name for Wireless Fidelity". To connect to a **Wi-Fi** LAN, a computer must be equipped with a wireless network interface controller.

Q7. How can I improve my Wi-Fi latency?

Ans.

1. Change the channel of your **wireless network** at the time of online gaming.
2. If possible, connect to a 5GHz **wireless network**.
3. Move your computer closer to the **WiFi** router.
4. **Minimize** the number of active Bluetooth devices connected to your computer.

Q8. Is Wi Fi the same as internet?

Ans. **Wi-Fi** and the **internet** are two separate things that work together. Think of the **internet** as a language and **Wi-Fi** as a method of sending and translating that language. Having a **Wi-Fi** signal doesn't always mean you have access to the **internet**. You need a modem, **Wi-Fi** router and an **internet** provider to make that happen.

Section – C

03X03 = 09 Marks

Q9. Bluetooth Is Called A Cable Replacement Technology. Explain.
Ans

- Bluetooth allows Personal Area Networks without the cables.
- It provides connectivity to many mobiles users at a time for sharing without wires.
- Bluetooth chip is designed for replacing cables by transmitting the information at a special frequency from sender to receiver.
- Bluetooth is an inexpensive,low-power, short range radio based technology.
- Cabling involves a lot of cost foe execution.
- Bluetooth is much more flexible and robust than cabling.
- They even require a very low bandwidth of data transfer.

Q10. Which Technology Is Used To Avoid Interference In Bluetooth?

Ans. Blue tooth uses frequency hopping technology. In this technology, 79 hop frequencies are transmitted and received from 2402 to 2480 mhz. hopping in a pseudo random sequence at a rate of 1600 times in a second. Guassian frequency shift keying modulation is utilized with a maximum data transfer rate of 721 kbps. Bluetooth protocol stack is developed and TCP/IP imported layers are used in this technology.

Interference is being avoided by utilizing the frequency-hop(FH) spread spectrum technology. It is adaptable for low-power, low-cost radio implementations and also used in certain wireless LAN products.

The major advantage with this technology transmission is the high rate of 1600 hops / ps. Another advantage is, short packet length is also used by Bluetooth.

Q11. What Is The Differentiate Between CDMA And FDMA ?

Ans. CDMA and FDMA

CDMA :

- Same frequency is used by every user and simultaneous transmission occurs
- Every narrowband signal is multiplied by wideband spreading signal, usually known as codeword
- Every user has a separate pseudo-codeword, i.e., orthogonal to others
- Only the desired codeword is detected by the receivers and others appear as noise
- It is mandatory for the receivers to know about the transmitter's codeword

FDMA :

- When the channel is not in use, it sits simply idle.
- Bandwidth of Channel is relatively narrow (30 KHz), known as narrowband system.
- Little or no equalization is needed for spreading symbol time.
- Analog links are suitable for FDMA.
- Framing or synchronization bits are not needed for continuous transmission.
- Tight filtering is needed to minimize interference.

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BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Computing Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, III Semester,

2nd In-Sem. Examination

Course Code: ITN1303 **Time: 1 Hour**

Course Name: Basics of Network Security **Max. Marks: 20**

Attempt all Questions

Section – A

05X01 = 05 Marks

Q1. The process of verifying the identity of a user.

a) Authentication b) Identification c) Validation d) Verification

Q2. Attempt to learn or make use of information from system and able to change information.

a) Active attack b) Passive attack c) Modification of message d) Masquerade

Q3. The art of breaking ciphers is known as _____.

a) Cryptology b) Cryptography c) Cryptanalysis d) Crypting

Q4. A public key cryptosystem is called asymmetric encryption because

a) Use single key b) Use multiple keys

c) Use two key instead of one d) None of above

Q5. The sender and receiver can confirm each other identity and origin/destination of the information.

a) Confidentiality b) Authentication **c)** Non-epudiation d) Notorization

Section – B

03X02 = 06 Marks

Q1. Describe the role of key in cryptography?

Q2. Draw the basic block diagram of cryptography and label it.

Q3. What is digital signature?

Section – C

03X03 = 09 Marks

Q1. Explain the symmetric encryption technique with example.

Q2. Explain RSA algorithm? Discuss.

Q3. Describe, in brief following security services: Confidentiality, Data integrity, Authentication, Accountability, Availability.

A

School of Computing Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, III Semester,

2nd In-Sem. Examination

Course Code: ITN1302 **Time: 1 Hour**

Course Name: Basics of Network Security **Max. Marks: 20**

Instruction: Answer All Questions

Section – A

05X01 = 05 Marks

05 objective type questions, each question carries 01 mark.

Q1. The process of verifying the identity of a user.

a) **Authentication** b) Identification c) Validation d) Verification

Q2. Attempt to learn or make use of information from system and able to change information.

a) **Active attack** b) Passive attack c) Modification of message d) Masquerade

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a) Use single key b) Use multiple keys c) **Use two key instead of one** d)None of above

Q5. The sender and receiver can confirm each other identity and origin/destination of the information.

a) Confidentiality b) **Authentication** **c)** Non-epudiation d) Notorization

Section – B

03X02 = 06 Marks

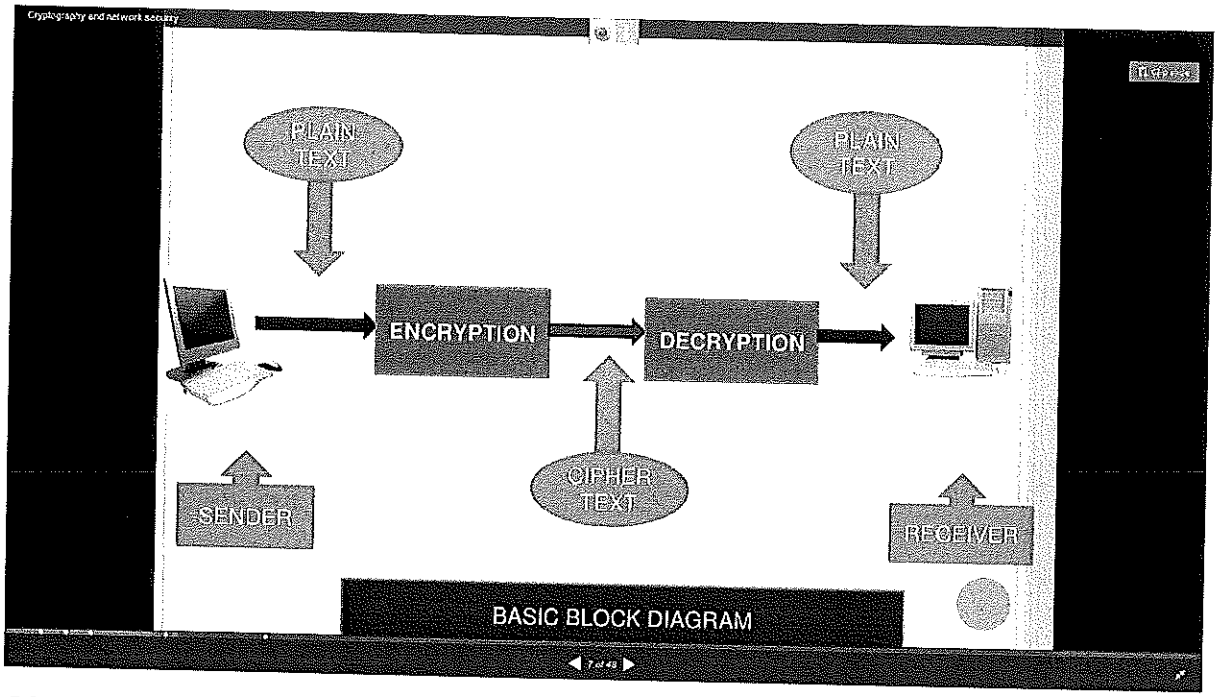
short answer type questions, each question carries 02 marks.

Q1. Describe the role of key in cryptography?

Ans: - One of the key role is confidentiality - information is only available to those who are supposed to have access to it. Encryption helps protect confidentiality of information transmitted over a network by (if it works as intended) making it difficult or impossible for

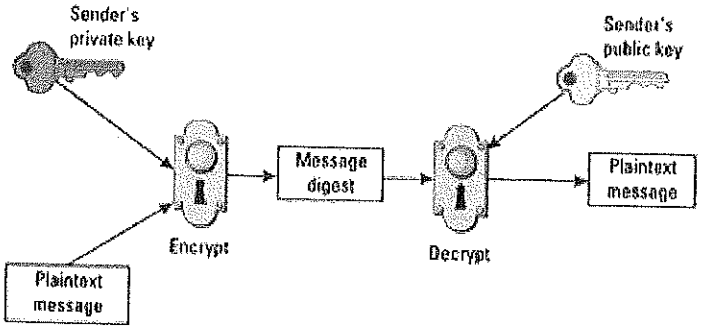
someone who is not authorized to have the information to make sense of it if they intercept the information in transit. In cases of data stored on a network, if it is stored in encrypted form, it can make it difficult or impossible for an attacker to get anything useful from the encrypted file.

Q2. Draw the basic block diagram of cryptography and label it. Also, write about the use of each block in diagram.



Q3. What is digital signature?

A digital signature allows a receiver to authenticate (to a limited extent) the identity of the sender and to verify the integrity of the message. For the authentication process, you must already know the sender's public key, either from prior knowledge or from some trusted third party. Digital signatures are used to ensure message integrity and authentication. In its simplest form, a digital signature is created by using the sender's private key to hash the entire contents of the message being sent to create a message digest. The recipient uses the sender's public key to verify the integrity of the message by recreating the message digest. By this process you ensure the integrity of the message and authenticate the sender.



Digital signature.

To sign a message, senders usually append their digital signature to the end of a message and encrypt it using the recipient's public key. Recipients decrypt the message using their own private key and verify the sender's identity and the message integrity by decrypting the sender's digital signature using the sender's public key.

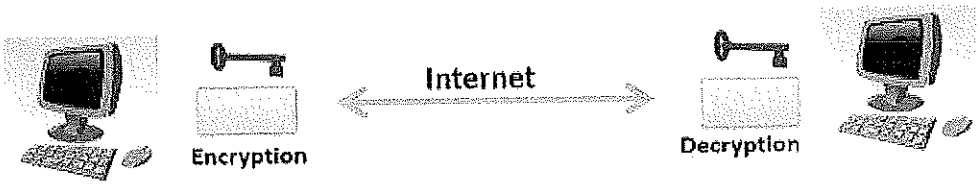
Section – C

03X03 = 09 Marks

03 essay type questions, each question carries 03 marks.

Q1. Explain the symmetric encryption technique with example.

Ans: - Symmetric Encryption: - Symmetric encryption is a technique which allows the use of only one key for performing both the encryption and the decryption of the message shared over the internet. It is also known as the conventional method used for encryption. In symmetric encryption, the plaintext is encrypted and is converted to the ciphertext using a key and an encryption algorithm. While the cipher text is converted back to plain text using the same key that was used for encryption, and the decryption algorithm. The commonly used symmetric encryption algorithms are DES, 3 DES, AES, RC4.



Symmetric Encryption

Q2. Explain RSA algorithm? Discuss.

RSA algorithm is a public key encryption technique and is considered as the most secure way of encryption. It was invented by Rivest, Shamir and Adleman in year 1978 and hence name **RSA** algorithm.

Algorithm

The RSA algorithm holds the following features –

- RSA algorithm is a popular exponentiation in a finite field over integers including prime numbers.
- The integers used by this method are sufficiently large making it difficult to solve.
- There are two sets of keys in this algorithm: private key and public key.

You will have to go through the following steps to work on RSA algorithm –

Step 1: Generate the RSA modulus

The initial procedure begins with selection of two prime numbers namely p and q, and then calculating their product N, as shown –

N=p*q

Here, let N be the specified large number.

Step 2: Derived Number (e)

Consider number e as a derived number which should be greater than 1 and less than (p-1) and (q-1). The primary condition will be that there should be no common factor of (p-1) and (q-1) except 1

Step 3: Public key

The specified pair of numbers **n** and **e** forms the RSA public key and it is made public.

Step 4: Private Key

Private Key **d** is calculated from the numbers p, q and e. The mathematical relationship between the numbers is as follows –

ed = 1 mod (p-1) (q-1)

The above formula is the basic formula for Extended Euclidean Algorithm, which takes p and q as the input parameters.

Encryption Formula

Consider a sender who sends the plain text message to someone whose public key is **(n,e).** To encrypt the plain text message in the given scenario, use the following syntax –

C = Pe mod n

Decryption Formula

The decryption process is very straightforward and includes analytics for calculation in a systematic approach. Considering receiver **C** has the private key **d**, the result modulus will be calculated as –

Plaintext = Cd mod n

Q3. Describe, in brief following security services: Confidentiality, Data integrity, Authentication, Accountability, Availability.

Ans:• Confidentiality: This term covers two related concepts:

Data confidentiality: Assures that private or confidential information is not made available or disclosed to unauthorized individuals.

Privacy: Assures that individuals control or influence what information related to them may be collected and stored and by whom and to whom that information may be disclosed.

•Integrity: This term covers two related concepts:

Data integrity: Assures that information and programs are changed only in a specified and authorized manner.

System integrity: Assures that a system performs its intended function in an unimpaired manner, free from deliberate or inadvertent unauthorized manipulation of the system.

- Availability: Assures that systems work promptly and service is not denied to authorized users.

Although the use of the CIA triad to define security objectives is well established,

some in the security field feel that additional concepts are needed to present a complete picture. Two of the most commonly mentioned are as follows:

- Authenticity: The property of being genuine and being able to be verified and trusted; confidence in the validity of a transmission, a message, or message originator. This means verifying that users are who they say they are and that each input arriving at the system came from a trusted source.
- Accountability: The security goal that generates the requirement for actions of an entity to be traced uniquely to that entity. This supports nonrepudiation, deterrence, fault isolation, intrusion detection and prevention, and after action recovery and legal action. Because truly secure systems are not yet an achievable goal, we must be able to trace a security breach to a responsible party. Systems must keep records of their activities to permit later forensic analysis to trace security breaches or to aid in transaction disputes.

A

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Computing Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, III Semester,

2nd In-Sem. Examination

Course Code: ITN1305 **Time: 1 Hour**

Course Name: Optical fiber communication **Max. Marks: 20**

Attempt all Questions

Section – A

05X01 = 05 Marks

1. Which one of the following is a single fiber contact connector?

   a. ST b. MPO c. FDDI d. MT-RJ

2. Which one of the following is NOT a connector termination tool?

   a. Shear b. Cleaver c. SC d. Stripper

3. Which one of the following factors affects the connector performance?

   a. Jacket b. Numerical Aperture c. Strength member d. Glass

4. A numerical aperture (NA) mismatch occurs when _____.

   a. NA is different b. NA is same c. NA is matched d. Do not depend on NA

5. Ferrules typically are made of_____.

   a. Sand b. diamond c. carbon d. metal

Section – B

03X02 = 06 Marks

Q1. What is the difference between single fiber connector and multiple fiber connector?

Q2. What are different important criteria for ferrule?

Q3. What is connector? List its different components.

Section – C

03X03 = 09 Marks

Q1. Explain the different steps for terminating epoxy and polish SC connectors.

Q2. Define both physical contact (PC) and angled physical contact (APC) finish. Explain how PC and APC finishes affect both insertion loss and back reflectance.

Q3. Explain the extrinsic factors that affect connector performance.

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Computing Skills

Session: 2019-20 (Summer Semester)

B. Voc. Program, III Semester

2nd In-Sem. Examination

ITN1305 Optical fiber communication

Time: 1 Hour
Max. Marks: 20

Section – A

05X01 = 05 Marks

1. Which one of the following is a single fiber contact connector?

a. ST b. MPO c. FDDI d. MT-RJ

a.

2. Which one of the following is NOT a connector termination tool?

a. Shear b. Cleaver c. SC d. Stripper

c.

3. Which one of the following factors affects the connector performance?

a. Jacket b. Numerical Aperture c. Strength member d. Glass

b.

4.A numerical aperture (NA) mismatch occurs when _____.

a. NA is different b. NA is same c. NA is matched d. Do not depend on NA

a.

5. Ferrules typically are made of_____.

a. Sand b. diamond c. carbon d. metal

d.

Section – B

03X02 = 06 Marks

Q1. What is the difference between single fiber connector and multiple fiber connector?

Connectors can be divided into two main groups: single-fiber connectors and multi-fiber connectors.

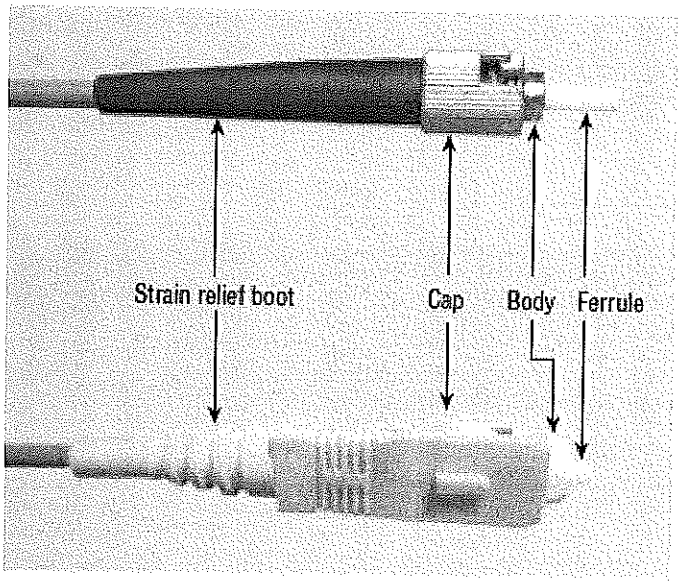
- Single-fiber connectors are designed for only one fiber, but they may be used to break out multiple fibers from a cable for individual termination in patch panels or hardware.
- Multi-fiber connectors may be used to connect paired fibers in duplex systems, or to connect entire ribbons of 12 fibers with one connector. They may also be used as a way to break out ribbon cables into individual fibers by using a *pigtail.*

Q2. the ferrule must align the optical fiber end precisely, it must meet several important criteria:
The ferrule must be strong enough to withstand many cycles of connection and disconnection without bending, cracking, or breaking.
The ferrule must maintain dimensional stability to ensure proper alignment of the optical fiber.
The ferrule must be of the right shape and have material properties to ensure a low-loss interconnection.

Q3. What is connector? List its different components.

A connector is a device that protects the end of the optical fiber while allowing it to be quickly and reliably joined to equipment or other optical fibers.

- Connectors are often used instead of splices to join two optical fibers together because they allow the optical fibers to be disconnected and reconnected easily.
- Splices, on the other hand, are permanent connections between two optical fibers.
- Connectors can be useful when network assignments must be changed, when equipment must be removed/replaced, or when expansion is anticipated.



Section – C **03X03 = 09 Marks**

Q1. Explain the different steps for terminating epoxy and polish SC connectors.

STEP BY STEP GUIDE - HOW TO TERMINATE EPOXY AND POLISH SC CONNECTORS?

TABLE OF CONTENTS

STEP 1: CABLE AND FIBER PREPARATION

1. Place cable support (rubber boot) and crimp sleeve onto fiber cable

Slip the cable support (rubber boot) and the crimp sleeve onto the fiber cable.

2. Measure and mark cable

Using either a scale or template, measure and mark the cable 34mm (1.35 inch) from the end of cable.

3. Remove outer jacket

Using the outer jacket removal notch on the 5-in-1 fiber stripping tool, remove the outer jacket back to the mark.

4. Insert sheath tube into cable jacket

For 3mm cable, insert the sheath tube over the buffer fiber and into the cable jacket

5. Trim strength member (Kevlar)

With the Kevlar (fiber strength member yarn) separated into two equal size bundles, use the Kevlar cutter to trim the strands 6mm (0.25 inch) from the edge of the outer jacket. Flair the Kevlar yarn evenly all around the cable.

6. Measure and mark buffered fiber

Measure and mark the buffered fiber 19mm (0.75 inch) from the end of the buffered fiber.

7. Remove buffer and fiber coating

Refer to the Micro-Strip heat-strip tool instructions for setup.

Make sure heater unit is fully inserted. Insert buffered fiber through the guide tube to allow 19mm (0.75 inch) of the buffer and coating to be removed.

Close the handles and wait 6 to 10 seconds for the buffer coating to be softened.

Pull the fiber from the tool with one smooth motion.

Wipe the stripped fiber with a wipe dampened with isopropyl alcohol to remove any residual coating.

Recommended dimensions:

The recommended dimensions for the prepared cable and fiber are shown below.

8. Set aside prepared cable

Place the prepared cable onto the fiber holder block in the tool kit.

STEP 2: EPOXY PREPARATION

1. Remove epoxy divider

This is a two-part epoxy separated with a divider. The divider must be removed to allow the epoxy to be mixed.

2. Mix the epoxy

Using the divider, thoroughly mix the epoxy until both parts are blended into a smooth, uniform color

3. Install the syringe tip

Place the syringe tip onto the syringe and twist to lock it in place. Then remove the plunger to allow the mixed epoxy to be loaded into the syringe.

4. Pour mixed epoxy into syringe

Fold the epoxy package in half, cut the corner of the package, and squeeze the mixed epoxy into the syringe.

Replace the plunger in the syringe.

5. Remove air from syringe

Remove air pockets from the syringe by holding the syringe tip upward and ejecting epoxy until the air pockets are removed.

STEP 3: CONNECTOR INSTALLATION

1. **Inject epoxy into connector body-**
   Gently insert the syringe tip through the tubing in the back of the connector body until it bottoms against the ferrule. Inject the epoxy into the ferrule until a bead of epoxy forms on the tip of the ferrule.

The epoxy bead should cover at least one-half of the ferrule end face.

Withdraw the syringe tip from the connector body, but maintain slight pressure on the syringe to coat the inside diameter of the metal ferrule flange (barrel) with the epoxy.

Important: DO NOT fill the plastic tubing with epoxy. DO NOT allow the epoxy to get onto the connector housing components.

2. Insert fiber into connector body

Immediately insert the fiber through the connector body, carefully feeling for the ferrule capillary.

Rotate the connector body as the fiber is inserted to allow the fiber to pass through the connector body without hanging up.

Be careful not to break the fiber.

3. Install cable sleeve

Slip the cable sleeve (crimp sleeve) over the outer jacket and the connector body to capture the Kevlar yarn between the connector body and sleeve.

4. Secure crimp sleeve

Before crimping, make sure the sleeve is fully seated on the cable retention member.

Align the crimp sleeve with the SC cavity of the crimping tool and squeeze the tool handles until they release.

5. Install cable support (rubber boot)

Push the cable support (rubber boot) over the crimp sleeve and onto the connector body.

6. Install connector holder

Place the connector body in a connector holder.

STEP 4: CURE THE EPOXY

1. Set-up the curing oven

Place the oven away from combustibles, and plug into a power outlet.

Turn on the curing oven, the switch will illuminate, indicating that the power is on.

In about 5 minutes, an illuminated READY lamp indicates that the oven is ready for use.

Important: If terminating 1.6mm jacket fiber cable, place the Heat Tube Assembly Fixtures into the ports of the oven.

2. Place connector into oven

Place the connector and holder assembly into one of the oven ports.

Cure for 10 minutes.

3. Cool down the connector assembly

After 10 minutes of curing time, remove the connector and holder assembly and place it into one of the ports in the holder block to cool.

STEP 5: CLEAVE FIBER AND POLISH CONNECTOR ENDS

1. Cleave the fiber

Remove the connector holder from the connector body.

Using one stroke with the cleaving tool, score the fiber close to the crest of the epoxy bead.

2. Pull away the fiber stub

Using a gentle straight pull, remove the exposed fiber.

If the fiber does not pull off with a gentle pull, re-score on the opposite side of the fiber.

3. Prepare polishing material

Before positioning the polishing material, clean the bare polishing plate and the back of the non-foam-backed polishing paper (lapping film) with a wipe dampened with isopropyl alcohol.

Blow the polishing plate and film dry with canned air.

Important: Foreign material can cause scratches on the end face of the ferrule if the polishing plate or paper is not properly cleaned.

4. Prepare polishing tool

Clean the surface of the polishing tool (polishing puck) and the connector tip with a wipe dampened with alcohol.

5. Air polish the cleaved fiber

Hold the 12um (or 15um) polishing paper (lapping film), dull side against the connector.

Point the connector ferrule upward and, using light circular or figure-8 strokes, polish the cleaved fiber down flush with the epoxy bead.

Note: This will reduce the risk of breaking the fiber during the first polishing.

6. Insert connector into polishing tool (polishing puck)

Insert the connector tip into the polishing tool (puck).

7. First polish - single mode and multimode connectors

Place a sheet of 3um polishing paper over the plate.

Carefully place the connector ferrule into the polishing tool (puck).

Starting with **extremely light pressure**, polish the connector using figure-8 strokes until all epoxy has been removed.

Check periodically with the eye loupe or magnifier to verify that all of the epoxy has been removed.

No Further polishing is required for multimode connectors.

Note: Extremely light pressure should be used during the first few polishing strokes to avoid breaking the fiber.

Start with a fresh area of the polishing paper (lapping film) for each connector to be polished.

Remove the connector from the polishing tool and clean both the connector and the tool with a wipe dampened with isopropyl alcohol.

Then use canned air to dry the connector and the tool.

8. Second polish - single mode connectors

To achieve optimum return loss, place the 1um polishing paper (lapping film) onto a polishing pad.

Add a small amount of distilled water to the portion of the film that will be the working area. Using the polishing tool (puck), work the water into the polishing paper.

Place the connector ferrule into the polishing tool and polish the connector ferrule for 6 to 8 strokes; each stroke should be approximately 51mm (2 inches) in height.

STEP 6: INSPECTION

1. Attach connector to microscope

Insert the connector tip into the bottom of the microscope. Open the microscope barrels to illuminate the connector tip, and use the side wheel to focus.

A high-intensity light may be used at the other end of the fiber to illuminate the core area.

The core may not necessarily illuminate if an epoxy film or bead still exists on the connector end face.

2. Inspect fiber end

An acceptable fiber end is free of cracks. Voids or scratches must be avoided in the core area.

If the fiber is unacceptable, then the fiber must be re-terminated.

3. Put on the dust cap

If the connector is not to be used right away, cover the connector end with a protective dust cap.

Q2. Define both physical contact (PC) and angled physical contact (APC) finish. Explain how PC and APC finishes affect both insertion loss and back reflectance.

Connector End face Preparation

Once the optical fiber is terminated with a particular connector, the connector end face preparation will determine what the connector return loss, also known as back reflection, will be. The back reflection is the ratio between the light propagating through the connector in the forward direction and the light reflected back into the light source by the connector surface. Minimizing back reflection is of great importance in high-speed and analog fiber optic links, utilizing narrow line width sources such as DFB lasers, which are prone to mode hopping and fluctuations in their output.

Flat Polish — a flat polish of the connector surface will result in a back reflection of about -16 dB (4%).

PC Polish — the Physical Contact (PC) polish results in a slightly curved connector surface, forcing the fiber ends of mating connector pairs into physical contact with each other. This eliminates the fiber-to-air interface, there by resulting in back reflections of -30 to -40 dB. The PC polish is the most popular connector endface preparation, used in most applications.

SPC and UPC Polish — in the Super PC (SPC) and Ultra PC (UPC) polish, an extended polishing cycle enhances the surface quality of the connector, resulting in back reflections of -40 to -55 dB and < -55dB, respectively. These polish types are used in high-speed, digital fiber optic transmission systems.

APC Polish — the Angled PC (APC) polish, adds an 8 degree angle to the connector endface. Back reflections of <-60 dB can routinely be accomplished with this polish.

Fiber Cleaving is the fastest way to achieve a mirror-flat fiber end — it takes only seconds. The basic principle involves placing the fiber under tension, scribing with a diamond or carbide blade perpendicular to the axis, and then pulling the fiber apart to produce a clean break. Our F-BK3 and FK11 fiber optic cleavers make the process especially quick and easy. It is wise to inspect fiber ends after polishing or cleaving.

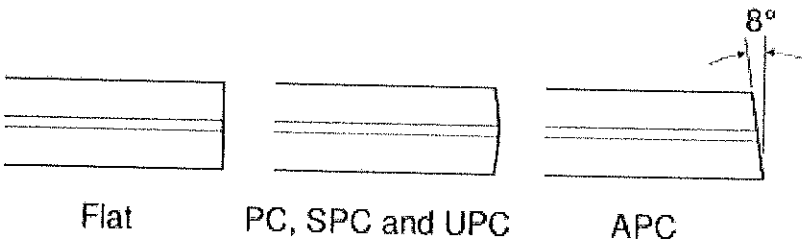
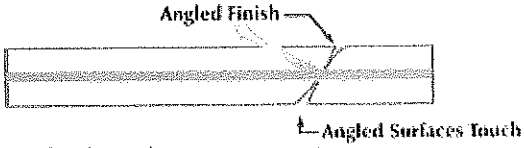


Figure 6: Connector Endfaces

Flat finish causes light to be reflected back into the fiber due to a step in the refractive index caused by the glass-air-glass interface.

Physical Contact (PC) finish minimizes backreflection due to the very small refractive index discontinuity.



Angle physical contact connector cause the reflection to exit the core and dissipate in the cladding.

Ultra polish connector finish uses several grades of polishing film to achieve an ultra-smooth surface.

Q3. Explain the extrinsic factors that affect connector performance.

Longitudinal Misalignment

Longitudinal misalignment (or endface separation) has two loss effects. The first is just loss of signal power caused by the fact that light exiting one fibre endface diffuses outwards and (depending on the amount of separation) some of it will not be within the NA of the other fibre and hence cannot enter it in a guided mode. The second effect is that the separated endfaces themselves constitute a Fabry-Perot interferometer. depending on the wavelength and the exact distance between the endfaces the attenuation can vary between zero and 100%.

Lateral Misalignment

Lateral misalignment is a major potential source of signal loss in all fibres but especially in single-mode fibres. A lateral displacement of one micron in an otherwise perfect join will result in a loss of .2 dB of signal. A displacement of 2.5 microns results in a loss of just more than 1 dB!

Fibre End Not Cut Square

If the fibre end is not cut square then you can't mate the two surfaces closely together.

Angular Misalignment

This problem is worst in single-mode fibres due to the very small mode field and the low RI contrast (low NA). A misalignment of only 1 degree produces a loss of .2 dB. A misalignment of 2 degrees causes a loss of around 1 dB!

Fibre End Irregular or Rough

Rough ends on the fibre scatter the light and prevent close contact between the fibre ends.

Most of the above comments apply to losses when connectors are used rather than when a fused join is made. In the case of a fused join, most of the above faults create a constriction in the fibre itself and a random perturbation of the RI. Losses in this context are hard to predict quantitatively but can be very large.

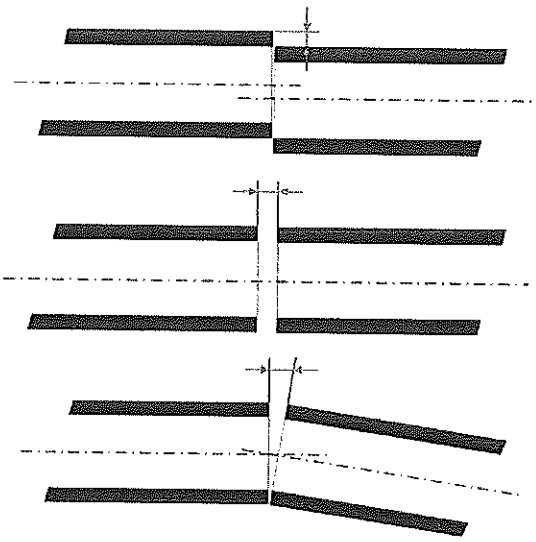
Insertion loss - extrinsic

Due to

Lateral offset

Axial separation

Axial tilt



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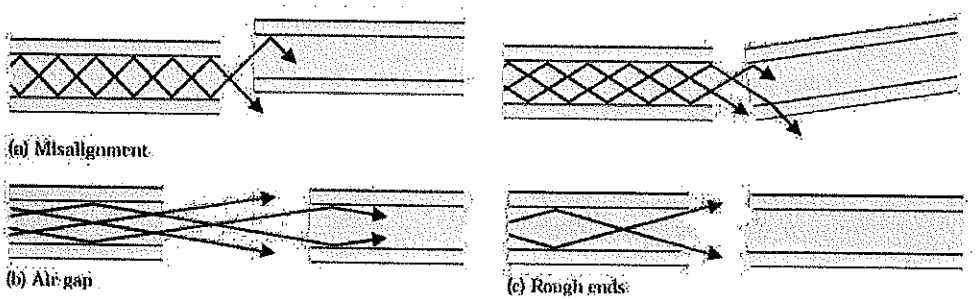
Splices and Connectors

- In fiber-optic systems, the losses from splices and connections can be more than in the cable itself
- Losses result from:
  - Axial or angular misalignment
  - Air gaps between the fibers
  - Rough surfaces at the ends of the fibers



BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Computing Skills

Session: 2020-21 (Summer Semester)

B. Voc. Program, V Semester,

2nd In-Sem. Examination

Course Code: ITN1504 **Time: 1 Hour**

Course Name: Internet of Things (IoT) **Max. Marks: 20**

Section – A

05X01 = 05 Marks

05 objective type questions, each question carries 01 mark.

1. Which transport layer protocols is used by DHCP?
   A) RSVP B) UDP
   C) DCCP D) TCP

2. Which is an open standard?
   A) CoAP B) MQTT
   C) XMPP D) HTTP

3. Which of the following is not a data link layer technology?
   A) UART B) HTTP
   C) Bluetooth D) Wi-Fi

4. What is the frequency range of the ultrasonic sound waves used by the ultrasonic sensors?
   A) 20000Hz to 25000Hz B) 25KHz to 50KHz
   C) 25Hz to 50Hz D) 25Hz to 55Hz

5. In the current market scenario, IoT captures the maximum share in which one of these?
   A) Security B) Healthcare
   C) Home automation D) Industry

Section – B

03X02 = 06 Marks

03 short answer type questions, each question carries 02 marks.

1. What is an IoT platform and why you need IoT platform?
2. Write down the differences between industrial IoT and consumer IoT.
3. What is the future scope of IoT?

Section – C

03X03 = 09 Marks

03 essay type questions, each question carries 03 marks.

1. You want to make a project and there is a need for angular rotation. Which component you will use to provide angular rotation? Write an Arduino code to run that component with Arduino.
2. What is M2M communication? How M2M works?
3. What is IoT analytics? Just brief types of IoT analytics.

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   A) RSVP B) UDP
   C) DCCP D) TCP

Ans. B) UDP

2. Which is an open standard?
   A) CoAP B) MQTT
   C) XMPP D) HTTP

Ans. A) CoAP

3. Which of the following is not a data link layer technology?
   A) UART B) HTTP
   C) Bluetooth D) Wi-Fi

Ans. B) HTTP

4. What is the frequency range of the ultrasonic sound waves used by the ultrasonic sensors?
   A) 20000Hz to 25000Hz B) 25KHz to 50KHz
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Ans. D) 25Hz to 55Hz

5. In the current market scenario, IoT captures the maximum share in which one of these?
   A) Security B) Healthcare
   C) Home automation D) Industry

Ans. D) Industry

Section – B

03X02 = 06 Marks

03 short answer type questions, each question carries 02 marks.

1. What is an IoT platform and why you need an IoT platform?

Ans. An IoT platform is a group of technologies that provide the building blocks for developing your product. IoT platforms provide the infrastructure you use to create the specific features of your solution. The goal of an IoT platform is to provide all the generic functionality for your application so you can focus on building features that differentiate your product and add value for your customers. By taking over the non-differentiated functionality, IoT platforms help you reduce your development risk and cost, and accelerate your product's time to market.

An IoT platform should cover following key tasks:

- Acquire real-world data via sensors
- Analyze data locally
- Connect to the cloud to transmit data and receive commands
- Store data in the cloud

- Analyze data in the cloud to create insights
- Command the "things" to perform specific tasks based on insights
- Present insights to users

Additionally, there are important "behind-the-scenes" capabilities IoT platforms should provide:

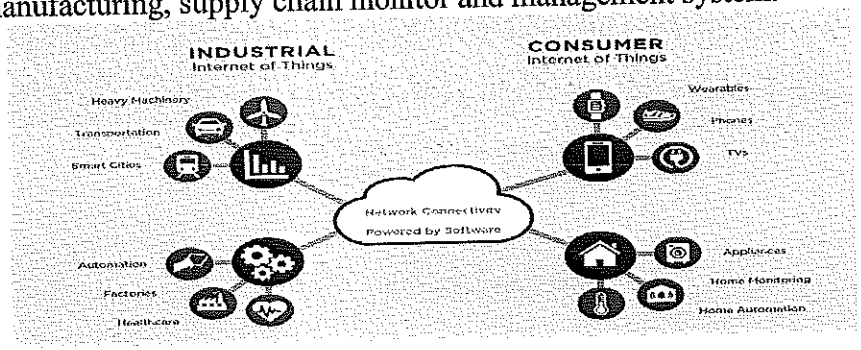
1. Perform all operations securely across the IoT technology stack
2. Identify and manage all of your IoT devices

Based on this simplified description, a good IoT platform should provide the tools and infrastructure to cover as many of these tasks as possible.

2. Write down the differences between industrial IoT and consumer IoT.

Ans. Difference between industrial IoT and consumer IoT

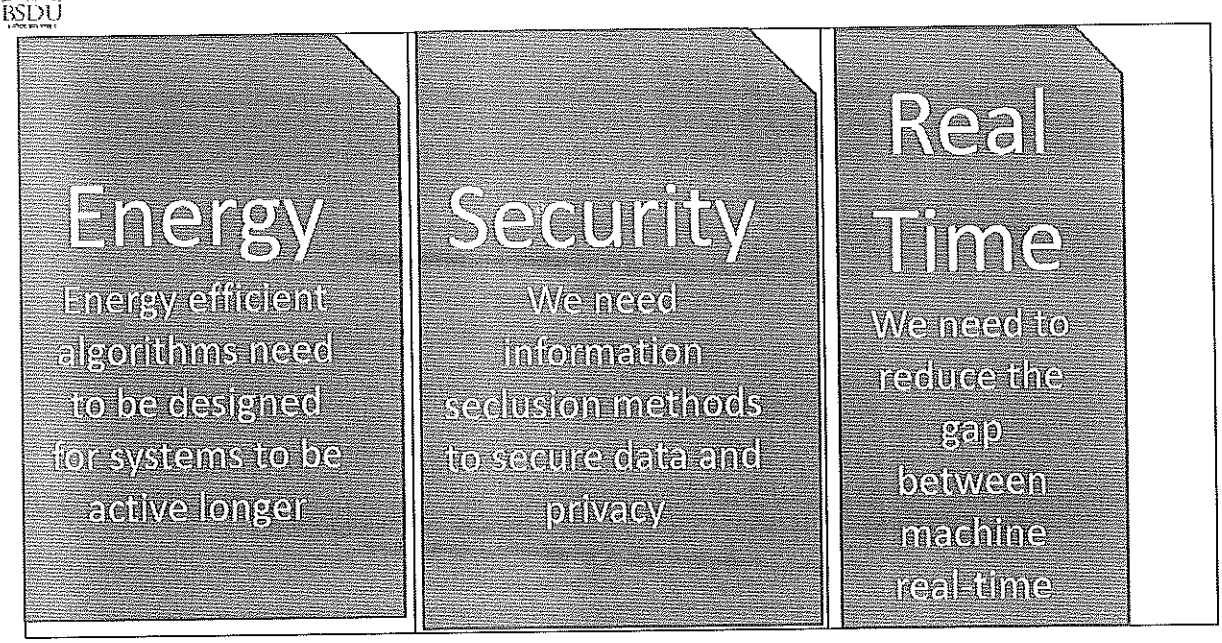
- Both industrial IoT (IIoT) and consumer IoT have the same main character of availability, intelligent and connected devices.
- The only difference between those two is their general usages.
- While IoT is most commonly used for consumer usage, IIoT is used for industrial purpose such as manufacturing, supply chain monitor and management system.



3. What is the future scope of IoT?

Ans. Future scope of IoT

- Internet of Things has emerged as a leading technology around the world. It has gained a lot of popularity in lesser time.
- Also, the advancements in Artificial Intelligence and Machine Learning have made the automation of IoT devices easy.
- Basically, AI and ML programs are combined with IoT devices to give them proper automation. Due to this, IoT has also expanded its area of application in various sectors.
- Further growth in the coming years will be possible thanks to new sensors, more computing power, and reliable mobile connectivity.
- Finally, the IoT market will grow because existing IT devices will need to be linked to the IoT.
- Still there is a need to improvement in energy sources, security and real-time applications.



Section – C

03X03 = 09 Marks

03 essay type questions, each question carries 03 marks.

1. **You want to make a project and there is a need for angular rotation. Which component you will use to provide angular rotation? Write an Arduino code to run that component with Arduino.**

Ans. To give an angular rotation to any IoT device we will use servo motors.
Arduino code for servo motor is as follows:

```
#include <Servo.h>
int pos = 0;
Servo servo_9;
void setup()
{
 servo_9.attach(9, 500, 2500);
}
void loop()
{
 for (pos = 0; pos <= 180; pos += 1) {
  servo_9.write(pos);
  delay(15);
 }
 for (pos = 180; pos >= 0; pos -= 1) {
  servo_9.write(pos);
  delay(15);
 }
}
```

2. What is M2M communication? How M2M works?

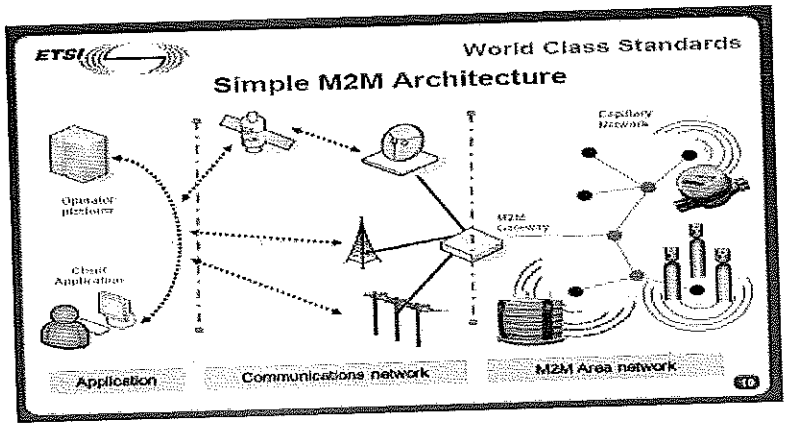
Ans. The machine to machine (M2M) concept represents any technology that allows two devices to exchange information with each other, for example, communicate and send data. The communication that occurs between the machines or devices is autonomous, there is no need for human intervention for this data exchange to take place.

M2M connectivity is related to the Internet of Things (IoT). Both are part of the same concept and complement each other. A system of machines or interrelated devices can be connected wirelessly, and exchange and analyze data automatically in the cloud.

Connectivity Types used in M2M

There are different types of connectivity between machines.

- First, we have the **RFID**, or radiofrequency identification. The limitation of this type of connectivity is that it has a maximum range of 10 meters.
- On the other hand, there are **Bluetooth** and **Wi-Fi** that also have a limited range, from 10 to 20 meters in the case of Bluetooth and 50 meters in the case of Wi-Fi.
- These types of connectivity are short range.
- Connectivity using **low frequency** has a range of up to 1,000 km and the **GSM** network (using SIM cards) or the satellite is worldwide.



How M2M Works

- Machine-to-machine communication makes the Internet of Things possible. According to Forbes, M2M is among the fastest-growing types of connected device technologies in the market right now, largely because M2M technologies can connect millions of devices within a single network. The range of connected devices includes anything from vending machines to medical equipment to vehicles to buildings. Virtually anything that houses sensor or control technology can be connected to some sort of wireless network.
- This sounds complex, but the driving thought behind the idea is quite simple. Essentially, M2M networks are very similar to LAN or WAN networks, but are exclusively used to allow machines, sensors, and controls, to communicate.
- These devices feed information they collect back to other devices in the network. This process allows a human (or an intelligent control unit) to assess what is going on across the whole network and issue appropriate instructions to member devices.

3. What is IoT analytics? Just brief types of IoT analytics.

Ans. IoT Analytics

IoT analytics is the method to gain value from large volumes of data generated by devices connected via the Internet of Things (IoT). Organizations can derive a number of benefits from it: optimize operations, control processes automatically, engage more customers, and empower employees. Organizations use Industrial IoT to collect and analyze data from pipelines, weather stations, sensors on manufacturing equipment, smart meters, delivery trucks, and other machinery. IoT analytics is also used in retail, data center management, healthcare.

Types of IoT Analytics

Descriptive analytics on IoT data

Focuses on what's happening, by monitoring the status of IoT devices, machines, products and assets. Determines if things are going as planned, and notifies if anomalies occur. Descriptive analytics is generally implemented as dashboards that show current and historical sensor data, key performance indicators (KPIs), statistics and alerts.

Diagnostic analytics on IoT data

Analyzes IoT data to identify core problems and to fix or improve a service, product or process. Diagnostic capabilities are typically extensions to dashboards that permit users to drill into data, compare it, and visualize correlations and trends in an ad-hoc manner. Many organizations employ domain experts knowledgeable about a specific process, machine, device or product, rather than data scientists, to perform diagnostics on data.

Predictive analytics on IoT data

Assesses the likelihood that something will happen within a specific timeframe, according to historical data. The aim is to proactively take corrective action before an undesired outcome occurs, to mitigate risk, or to isolate opportunities.

Prescriptive analytics on IoT data

Suggests actions based on the result of a prediction or diagnosis, or provides some visibility to the rationale behind a prediction or diagnostic. Recommendations tend to be about how to optimize or fix something.