**MIDTERM Test 3**

Section A

1. B
2. C
3. B
4. D
5. D
6. C
7. B
8. D
9. C
10. A
11. C
12. C

Section B

Q. 1   
1. Mission and Vision of government regarding Spectrum Management

- Judicial and economic approach to national spectrum allocation, as per the bandwidth requirements and access of spectrum

- Monitor spectrum utilization is done rightfully and without violation

- Cost effective and long term strategy for spectrum utilization

- Spectrum should be free from interference in allocating to various other service users

- Electromagnetic wave compatible

- ensure Certified Equipment used only

- Global Harmonization

2. Four agencies/industries NTIA is responsible for Spectrum Management

NTIA oversees Spectrum allocation Government use and purposes. Hence following ae the agencies that NTIA usually is responsible to look after –

1. Defense
2. Aviation
3. NASA
4. Public telecommunication, Government use only/ tapping imp or suspicious calls

Q.3

According to RF Safety issues OET 65 (FCC) ,

**MPE – Maximum Permissible Exposure**

* This is the maximum exposure to the radiation of the frequency for humans
* It is calculated to determine separation distances
* FCC required MPE study for both Mobile devices and fixed devices that use high end antennas
* People are aware of hazards of working around high end antennas around in test env, manufacturing environments and radio facilities

It has limit of 5mW/cm2 over 5 min period

**SAR – Specific Absorption rate**

* It is used to test for body worn devices
* It determines the device radiation absorption rate for speifc frequency wrt to the device in contact and for a duration

Your communication system operates in a 20mm wavelength. You have to fill out the FCC application that requires the frequency spectrum instead of wavelength. What would be a 20mm wavelength in frequency (Hz)?

We have a formula – V= frequency X wavelength

Where v = velocity of light i.e. 3 x 108 m/s

Here we have 20 mm wavelength i.e. 20 x 10-3 m

Frequency = Velocity / Wavelength

= 3 x 108/ 20 x 10-3

= 0.15x 1011

= 15 x 109Hz

Hence, **Frequency is – 15 x 109Hz**

**Q. 4**.

In Cyberattacks there are two types - “Active Attacks” and “Passive Attacks” as explained below---

Active Attacks –

* Active attacks are those having a script or the hacker actively working and live in the hacked system
* Active attacks are the ones demanding for something in return like ransomware attacks, phishing,
* Active attacks are controlled by external entity / person/ device
* The attacker actively takes control of the system
* It actively performs operations within the system of the attacked entity, collects information, scans all the DNS servers
* Takes control of domain controller in the server
* Runs ARP to get all the connected devices in the network

Examples – Botnets, Phishing email, TCP Server scanning, Darknet attack, Ransomware, DNS Server, TCP Session hijacking

Passive attacks –

* Passive attacks are those where the Attacker is not actively collecting information or damaging the system
* It could be a trespassing activity, where the attacker observes the attacking system
* The end user is not aware of being under attack in passive attacks
* Listening to the conversation / tapping the data packets transferred between two communicating entities is also an example of passive attack

Example – port scanning , wire tapping , Packet sniffing

**SECTION C**

**Q1**. The Constitution of 1789 gives congress the regulatory powers. Following are the two goals of regulation from the constitutional point of view

**Goal 1**. Change in behaviour of the system to avoid benefits of an individual are not affected to others

**Goal 2.** Control employees of their administrative tasks

**Goals of Economic –**

* Healthy competition amongst the service providers
* Avoid monopolies
* Promote innovation
* Keep a check on entry into the business
* Provide cost effective service with price control

**Goals of Social Regulations –**

* Protect – Humans and the environment by corrective actions like regulation frequency, avoid harmful radiations
* It regulates the safety of humans and environment stability
* Assure - Assure quality and efficient service with safety, products safety
* Prohibit – violation of any law, order
* Ensure equality wrt race color sex age

**Statutory regulations –**

These are related to the individuals profession. They should have valid licence and registration to conduct their business by a regulatory body.

For example, licensed electrical, radio, doctors, lawyers, civil engineers etc

Q.2.

**Electromagnetic Spectrum**

Electromagnetic spectrum is the band of all the frequencies having all forms of lights in the universe. These are formed with the Electromagnetic waves which are waves having electric field and magnetic field which are oscillating in two dimensions.

The Spectrum consist of –

High frequency band waves (300 EHz, 30PHz) – like Gamma rays, X-rays,

ultraviolet rays(790 THz), Visible light(430Thz), Infrared waves(300 GHz)

and Low Frequency band waves – Microwaves (3MHz) and radiowaves(3kHz)

**Goals of Spectrum Policy Reform –**

* Efficient utilization of Spectrum
* Electromagnetic compatibility of devices
* Global Harmonization
* Interoperability and roaming facility
* Operation free from interference
* Reform under used spectrum

**Needs of spectrum policy reform –**

* There is an artificial scarcity and insufficient of spectrum for commercial purposes
* Advanced technology demands higher frequency and spectrum availability
* Available spectrum is not used efficiently
* Licenses rule market flexibility

**if the spectrum policy is not reformed-**

* There will be inefficient use of existing spectrum allocated
* The service provider will go bankrupt without efficient use and without making best utilization of the spectrum
* There will be no innovation to promote spectrum sharing,
* Spectrum sharing won’t be promoted
* These will create artificial scarcity of spectrum availability

**Q** **3**.

POTS – Plain Old Telephone Service

* + POTS need end devices to be connected through a network
  + They are operated through circuit switched networks
  + Later the Operators were replaced by automated switch mechanism and help in connecting the two operators

ISDN –

Integrated Service Digital Networks

* ISDN is a Dial-up service
* Cannot have high speed data rates
* They are working based on the existing telephone line copper wired networks, they support both packet switched networks as well as circuit switch
* ISDN service helps in sending out FAX over the telephone line
* It sends out the data along with the voice call within the network
* They have integrated voice call along with data services hence known as ISDN
* They are of two types – Narrowband ISDN & Broadband ISDN

DSL – Digital Subscriber Line

* Always On line the user can instantly use the Network service
* Offer higher data rates
* DSL uses high frequency bands for data data trasnfer and low frequency bands for the voice calls
* Consists of two types Symmetric DSL ( having both uplink & downlink speed same ) Asymmetric ADSL ( having different Uplink & downlink speeds)

Key points about Wireline Regulations—

* The rates of wireless and wireline services are not tariffed or regulated in United states
* FCC regulates with the basic human and environment safety regulation/ requirements
* FCC Maintains balance in evolving technologies and competitions and converge both at a later stage
* It also regulates the radiation safety for wireline service operations

**Q** **4.**

TCP Session Hijacking –

* TCP Session hijacking is with the SEQ & ACK numbers that are communicated within the two i.e. Client and Server.
* A TCP Connection is established once the client and server negotiates with the REQUEST and an Acknowledgment from the server ends. Once connection is established there is a continuous packet exchange between these end devices.
* The data packets communicated between the two Client and server are tracked and are constantly checked by a middleman who tries to figure out the possible SEQ number and ACK number which helps hijacker to setup the next sending SEQ & ACK numbers between communicating end devices.
* Since this is third man between two speaking entities it is also known as man – in the middle attack

Situation this kind of cyber attack is possible—

* When the hijacker and the client/server are on the same network the hijacker can track the data- packet communication
* The hijacker sniffs through the packets communicated among the systems
* He figures out the next packet Sequence and ACK number
* If he successfully get through the next packet seq & ack he can successfully launch an attack between them
* The number of SEQ & ACK is small then the hijacker can quickly identify the next seq and ack & launch attack

Diagram representing TCP Hijacking cybercrime –

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