

(1)

class test - 02

(1)

(a) Write the difference between 3G+ channel signalling and common channel signalling? — (4)

(b) What is PBX? Write briefly about its parts — (4)

(c) How does signalling Techniques enable? Describe about subscribers, loop, interexchange signalling and intraexchange signalling? — (6)

(2)

(a) What is OSS and BSS architecture? — (4)

(b) What is switching? Describe the importance of switching and some mathematical concepts about it. — (4)

(c) What is telecommunication? Write some of advantages that future holds? — (4)

(3)

(d) Define briefly about the following topics — 8
① AMPS ② FDMA ③ Digital AMPS ④ GSM ⑤ CDMA.

(e) Write about 5G and its advantages — (6)

(2)

(4) What is e/I ratio and fading? Describe briefly — (6)

(5) What is path loss of a cellular system? — (4)

(6) What is wireless pre-cellular systems? — (4)

(5)

(a) Write about registration and its classification — (5)

(b) What is roaming and tell briefly about MSC and cellular structure? — (4)

(c) What is fading systems of a cellular system? — (5)

(6)

(a) How many basic topologies are used in the process of interconnecting exchange of telephone network? — (6)

(b) What is PSTN? Describe the major systems of any telecommunication network. — (6)

(c) What is subscriber loop systems? How it works? — (4)

7

- (a) What is transmission planning? Write about it — (6)
- (b) Draw the echo as reflected signal and draw the diagram of attenuation vs echodelay — (6)
- (c) Write down the basic three categories of transmission system? — (2)
- (d) How a national numbers consist of? Describe it — (4)
- (e) What do you mean about the types of numbering? — (6)
- (f) How many categories used to place radio communication for long distance. — (4)

Ans to the question no - 1

(a)

Sim-channel signalling

- ① Trunks are held up during signal.
- ② Interference between voice and control signals may occurs.
- ③ Separate signalling equipment is required in each trunk hence expensive.
- ④ Can be misused by customers since it is easy to mimic voice signalling.
- ⑤ Signalling is relatively slow.
- ⑥ It is difficult to change signals or add new signals.

Common channel signalling

- ① Trunks are not required for signalling.
- ② No interference since the voice and control channel are separate.
- ③ Only one set of signalling equipment is required for a large group of trunk circuit hence economical.
- ④ Signalling is much faster.
- ⑤ Control channel is in-accessible to users.
- ⑥ There are flexibility to add new signals or change existing signals.

(b)

PBX PBX stands for private branch Exchange. Private Branch Exchange is a telephone system within a local area that switches between those users on local lines while allowing all users to share a common numbers of external phone line. The main purpose of PBX is to save the cost of requirement for a line to each users to the central exchange office.

The parts of PBX is given below

- ① A telephone trunk that connects every phone lines, which are terminated at PBX.
- ② A computer that handles the incoming and outgoing call of PBX along with switching between different calls within the local loop.
- ③ The networks of lines within the PBX.
- ④ A human operators console, which is optional.

(c)

Signaling techniques enable the circuit to function on a whole by inter connecting all varieties of switching systems. There are three forms of signaling involved in a telecommunication network.

These are:

i) subscriber loop signaling:

The subscriber loop signaling depends upon the type of telephone instrument used.

ii) intra-exchange signaling:

The intra exchange signaling refers to the internal portion of a switching system that is heavily dependent upon the type and design of a switching system, which varies depends upon the model.

iii) inter-exchange signaling:

The inter exchange signaling takes place between exchanges. This helps in the exchange of address digit, which point from exchange to exchange on a click link basis.

Ans to the question no: 2

① OSS stands for operational support system

It is a term used by operators to manage their communications networks. Originally known as Telecommunications Network Management tools these solutions are now so much more sophisticated. They allow an organisation to co-ordinate customer services, resources, processes and activities. They assist operators to design, build, operate and maintain communications networks.

BSS BSS stands for Business support system. BSS is the term traditionally used to describe the business or customers facing functionality. These tool allow an organization to interact with their customers create offers for them, issue customers with bill as well as cross-carrier transaction.

② Switching: Switching is process to forward packets coming in from one port to a port leading towards the destination when data comes on a port it is called ingress, and when data goes out one port then it is called egress.

Importance of switching:

- ① If there are no switching machine, each phone would have to be directly connected to all others.
- ② It helps to emit from many essential work that is very useful for switch/system.
- ③ It helps to carry information one place to another without any problem.

Approximately 250 million phones.

$$\text{Fully connected: } \frac{n(n-1)}{2} \approx \frac{25000000^2}{2} \approx 9 \times 10^{16} \text{ points}$$

$$\text{Average wire pair cross section} = \pi r^2 = \pi (2 \text{ mm})^2$$

$$= 12.5 \text{ mm}^2 = 12.5 \times 10^{-12} \text{ km}^2$$

Assume, average connection is 2000 km long:

$$\begin{aligned}\text{Therefore volume of wiring} &= 9 \times 10^{16} \text{ points} \times 200 \text{ km} \times \\ &\quad 12.5 \times 10^{-12} \text{ km} \\ &= 750 \text{ million km}^3\end{aligned}$$

$$\therefore \text{Depth of wiring} = \frac{750}{12.5} = 10 \text{ km}$$

So deep is 60 km.

①

Telecommunications "tele" - Greek for distant And "communicates" - Latin for connection

So Telecommunications is distant connection or transfer of meaningful information from one location to another. Some of advantages that future hold:

i) Expansion to the developing world -

- opportunities to build green fields "network design"
- short cut to the latest technology.
- Huge role for fixed wireless and satellite.

ii) machine to machine communication -

- more machines than humans
- can exchange data more quickly
- pervasive computing
- seamless human-machine interfaces, wearable computers.

iii) Convergence of - telephone, TV, movies, telemetry, monitoring, internet.

iv) Future Applications virtual reality 3D holography, tele-presence, web agent, robots, weather prediction

Ans to the question no 8(a)

④ GMSK

- ④ Advanced mobile phone system
 - still used in Alberta and across North America
 - analog system developed in 1977 introduced in 1983

⑤ FDMA system as pattern of frequency assigned.

Each pair of frequencies is dedicated to a call in each cell.

| | | | |
|---------|-----|----------|-------|
| 800 MHz | 800 | 800.2005 | 801.4 |
| A | A | B | A |

800 MHz 800 800.2005 801.4

Block A: inter-cellular companies

Block B: intracell

FDD: Uplink frequency are the same but 95 MHz less for the same channel.

Digital AMPS:

④ Digital system in AMPS bands

④ the first digit to arrive here

Ans to the question on 3G

3G network radio

- ① 3G technology allows fast advanced, streaming, multimedia services and longer network coverage.
- ② It helps a wider variety of cell phones to operate on the network.
- ③ It allows a wider spectrum which helps in faster data transmission.
- ④ The connection can deliver 3G at a reduced cost compared to 2G.

Ans to the question no: 4

①

C/I ratio

- ② The correct-to-interference ratio, g_i of the signal of the mobile from the transmitter in a given cell can be found in an approximate manner by summation of interference from all base stations using the same frequency usually expressed in dB

$$\frac{g_i}{1} = \frac{P^{-\alpha}}{\sum_{j=1}^n D_j^{-\alpha}}$$

(b)

Path loss:

→ Power radiates from the transmitter antenna in a spherical manner.

- the power at d metres away from the transmitter is given in reference to the power P_0 , some d_0 metres away

$$\frac{P_d}{P_0} = \frac{4\pi d^2}{4\pi d_0^2} \quad P_d = P_0 \left(\frac{d}{d_0}\right)^2$$

In general and terrain characteristics can result in a different power law for the previous equation. We generate the power law by the coefficient α where α usually ranges from 2 to 4.

(e)

wireless PTT-cellular systems:

→ wireless transmission was originally shown as a method to monitor continuous contact with ships.

→ So 1946 FM consumer mobile phone systems were introduced

- A group of frequency allocated to large geographic zone.
- when moving to a new zone calls had to be reinitiate.
- 120 kHz per channel due to poor filter technology.

Ans to the question no: 5

- ① Registration: Registration is the process of notifying the network that a phone is active on the system.
 - when a phone is switched on, it registers by signalling to the base via the base station on a step-up on control channel.
 - Periodic registration is when the phone announces itself on a regular basis.
 - If the channel strength fades below a threshold, the phone selects another channel.

b

Roaming: Roaming is when a phone is outside its home area or local region.

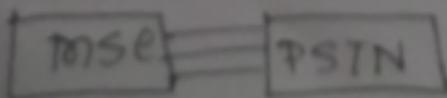
If the phone registers outside its home area, the MSC contacts the phone's home office and confirms that the phone is ok. Then MSC notifies home area of the phone's current location and provides instructions for routing incoming calls to the phone.

cellular structure:

MSC — mobile switching control (also called)

MTSO - mobile telephone switching office.

PSTN — public switched telephone network.



④

Fading: During transmission from the base station to the mobile, the received power fluctuates, we can generalize the factors that affects the received power level into 3 main groups.

i) Path loss

ii) Long term fading or shadowing.

iii) short term fading.

Ans to the question no: 6

⑤

In the process of interconnecting exchanges there are three basic topologies.

i) ring topology.

ii) star topology.

iii) Hierarchical

⑥

PSTN (Public switched telephone Network).

PSTN is understood as an aggregate of world's switched telephone networks used for providing public communication.

The major system of any telecommunication network is given below:

- ① subscriber end instruments or equipments.
- ② subscriber loop system.
- ③ switching system.
- ④ transmission systems.
- ⑤ signalling system.
- ⑥ central office equipment or tandem equipment.

Ans to the question no: 7

(a)

Transmission plan: For reasons of transmission quality and efficiency of operation of signalling

- ① The maximum numbers of circuits to be used in an international is call 12.
- ② No more than four transmission international circuits can be used in tandem between the originating and the terminating international switching centres.

(b) The figure of echoes as reflected signal and the attenuation echo delay is given below:

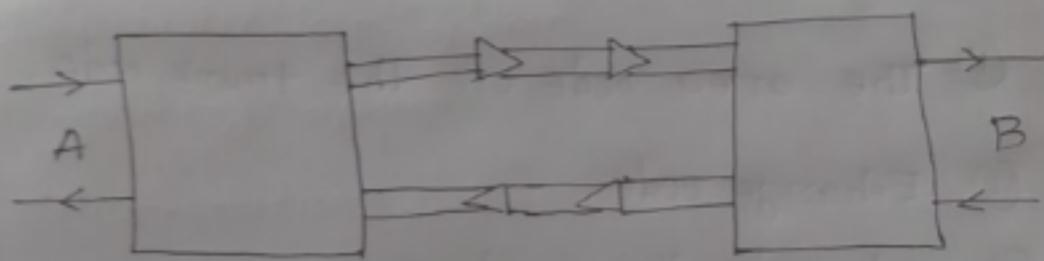


Fig: Echo reflected signal.

(c)

- (i) Radio systems.
- (ii) Coaxial cable systems.
- (iii) Optical fibre systems.

Ans to the question no - 8

(a) A national numbers consist of three parts.
They are given below:

- (i) The area code or the trunk code.
- (ii) Exchange code.
- (iii) Subscribers line numbers.

(b) Types of numbering plan:

- (i) Open numbering plan.
- (ii) semi open numbering plan.
- (iii) closed numbering plan

⑥

radio communication is the modern long distance transmission systems.

It deals with electronic radiation of electromagnetic energy from one point to another through the atmosphere or free space. It is possible only in a certain portion of the electromagnetic frequency spectrum. This portion includes frequencies from 9 kHz to 4000 Hz, while there are international allocations for the radio spectrum upto 27.5 MHz most of the commercial users take place between 100 KHz and 90 MHz.