Dayananda Sagar College of Engineering

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(An Autonomous Institute Affiliated to VTU, Approved by AICTE & ISO 9001:2008 Certified)
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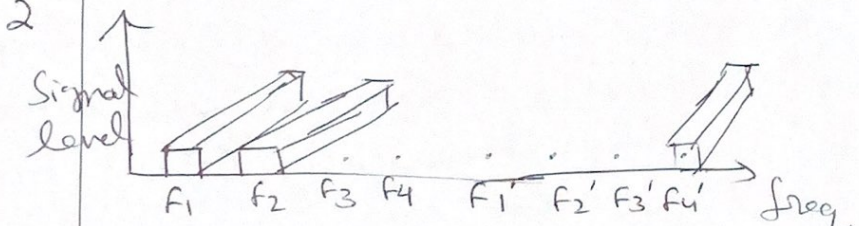
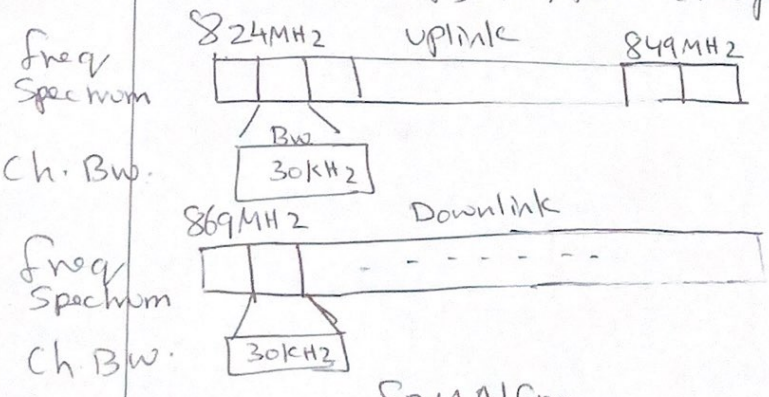
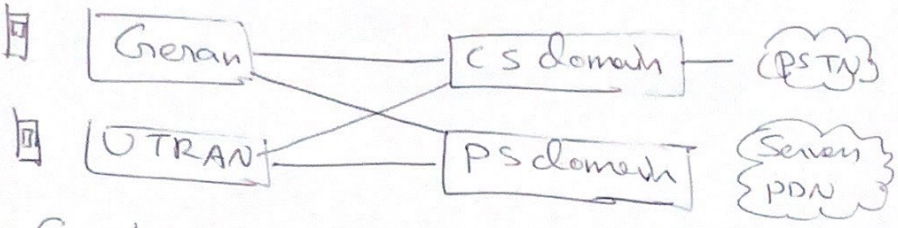
Date of test : 31/1/22		Max Marks : 50.
Day : Monday		Sub Mentor : Dr Jagadeesha
Branch : E and C		Sub Mentor Sign:
Semester : 7th		Staff i/c of sec :
Section : ALL	Internal Test	Staffs i/c sign :
Timings : 11.15 - 12.45	CIE-	HOD Name : Dr. TCM
Test Duration : 1½ Hrs.	Test Solutions	HOD's sign :

Q. No.	Test question paper solutions with steps	Marks Allocation
1	a. AMPS b. 64 c. CDMA d. 5G e IMT 2000 f Claude Shannon g. ∠ channel capacity h. 4G. i. 3Gpp j OFDMA	10
2	 FDMA/FDD Concept  FDMA/FDD Explanation:	4+4

2b $N = \frac{(B_t - 2B_G) / B_c}{} = \frac{(12.5 \times 10^6 - 2(15 \times 10^3)}{25 \times 10^3} = 498.8$ (2)

$\simeq$ 499 channels

3 a)



10M

Explanation must be complete with all terminology

→ 3Gpp LTE evolved from UMTS & GSM.

→ PLMN Nw has 3 components (i) Radio Access Nw (ii) Core Nw (iii) Mobile phone.

→ Core Nw has two domains :- Circuit switched & packet switched

→ RAN handles Core Nw's radio Comm with user

→ Two separate radio access Nws namely GSM & edge (Geran) and UMTS (Terrestrial radio access Nw). They use the techniques of GSM & UMTS. but share a Common Core Nw.

→ The user equipment (Mobile) Communicates with radio access Nw over air interface known as radio interface

→ Direction of link - forward or uplink :- Mob to Nw
Reverse or downlink - Nw to Mob.

4(a) As there is a fixed amount of radio spectrum and simultaneous Communication Links has to be provided to many subscribers in a given area. Multiple access techniques are used to increase subscriber Capacity by sharing the Spectrum among many subscribers while maintaining desired quality.

→ Techniques are FDMA, TDMA, SDMA, CDMA, OFDMA.

Test question paper solutions with steps	Marks Allocation
4b) Diagram of of D.M. → data distributed over multiple carriers. → SubCarriers are orthogonal. → PSD of each each subcarriers will occur at point while the other subcarrier powers will be zero. So minimal interferance betn subcarriers. → Explanation of fig. → Modulation by Q psk. → data Transmitted in bursts each burst having Cyclic prefic & data symbols. → Cyclic prefix absorbs transients from previous bursts caused by multipath. → Resulting waveform is not a fnction of any sample from previous bursts.	4 6
5) 2 Diagrams of the evolution from GSM & CDMA Explanation	5 5
6) fig Showing evolution from GSM & UMTS to LTE with full explanation. → Epc (evolved packet core) replacement of packet switched domain. → Epc distributes distributes user voice & data using packet switching. → GSM & UMTS used packet switching only for data. Voice using VoIp. → E-UTRAN handles Epc radio comm with mobile replacing UTRAN. → designed as two 3Gpp work Items	4 6

Q. No.	Test question paper solutions with steps	Marks Allocation

(i) System evolution time evolution (SAE) which covers Core Nw.

(ii) LTE Coveres Radio N.W, air interface & mobile.

→ Whole System is called Eps.

→ LTE refers to evolution of air interface

→ but LTE is more popularly used ~~to~~ colloquially as the whole System.

7 a) 4G - LTE requirements of IMT - Advanced — 5

Peak data rate - 600Mbps downlink
270Mbps uplink

Bw of 40MHz.

LTE advanced

Peak data rate - 1000Mbps downlink
500Mbps uplink

designed to deliver 3000 to 1500Mbps.

Total Bw of 100MHz., made into 5 Components of 20MHz each.

Spectral efficiency 3.5 to 6 times greater on uplink than that of downlink.

LTE & LTE advanced are Compatible & they can operate with the existing Base station.

7 b) 3GPP Specification Series. — 5

Refer Table 1.5