Modified

CBCS SCHEME

USN | | | | | | | | | | |

17EC81

Eighth Semester B.E. Degree Examination, July/August 2021
Wireless Cellular and LTE 4G Broadband

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions.***

1	a.	Explain the advantages of OFDM leading to its selection for LTE.	**(08 Marks)**
	b.	Explain adaptive modulating and coding with neat block diagram.	**(08 Marks)**
	c.	Explain briefly path loss.	**(04 Marks)**
2	a.	Explain with neat block diagram flat LTE SAE architecture.	**(08 Marks)**
	b.	Explain delay spread and coherence bandwidth.	**(08 Marks)**
	c.	Mention advantages and disadvantages of cell sectoring in cellular wireless communications.	**(04 Marks)**
3	a.	Explain the basic multicarries transmitter and receiver with neat block diagram.	**(08 Marks)**
	b.	Explain the principle of operation of OFDM downlink transmitter with neat sketch.	**(08 Marks)**
	c.	Mention the differences between V-BLAST and D-BLAST encoding techniques.	**(04 Marks)**
4	a.	Explain peak to average power ratio (RAR).	**(08 Marks)**
	b.	Explain SC-FDMA uplink transmitter and receiver with neat block diagram.	**(08 Marks)**
	c.	Compare OFDM and SCFDE.	**(04 Marks)**
5	a.	Explain uplink and downlink transport channels.	**(08 Marks)**
	b.	Explain frame structures used in LTE.	**(08 Marks)**
	c.	Explain Broadcast channel used in LTE.	**(04 Marks)**
6	a.	Explain LTE end to end network architecture with neat block diagram.	**(08 Marks)**
	b.	With neat block diagram explain radio interface protocols stack.	**(08 Marks)**
	c.	Explain uplink transport channels.	**(04 Marks)**
7	a.	Explain the types of uplink reference signals.	**(08 Marks)**
	b.	With neat block diagram, explain the uplink transport channel processing.	**(08 Marks)**
	c.	Explain buffer status reporting in uplink.	**(04 Marks)**
8	a.	Explain with neat sketch cell search procedure used in LTE.	**(08 Marks)**
	b.	Explain random access procedure used in LTE.	**(08 Marks)**
	c.	What is meant by periodic and aperiodic reporting in CQI feedback?	**(04 Marks)**
9	a.	Explain RRC states and function with neat sketch.	**(08 Marks)**
	b.	Explain mobility management over X2 mobility with neat sketch.	**(04 Marks)**
	c.	Explain data transfer modes.	**(08 Marks)**
10	a.	Explain RAN procedure for mobility.	**(08 Marks)**
	b.	Explain the main services and function of RLC and MAC layers.	**(08 Marks)**
	c.	Explain paging used in RRC protocol.	**(04 Marks)**

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Re: Sir, regarding modification of scheme and solution(17EC81)

"Mrityunjaya Vithal Latte" <mvlatte@rediffmail.com> July 31, 2021 11:40 AM

To: boe@vtu.ac.in

Dear sir,

The scheme of 17EC81 is verified and it is inline with the question paper .
Regards

PROF. MRITYUNJAYA V. LATTE
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From: <boe@vtu.ac.in>
Sent: Wed, 28 Jul 2021 11:19:46
To: mvlatte@rediffmail.com, mvlatte25@gmail.com
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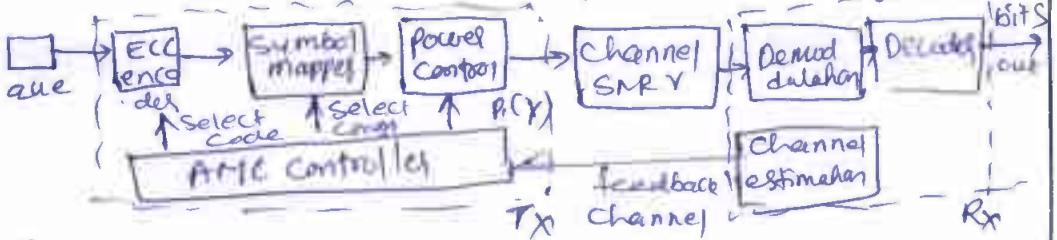
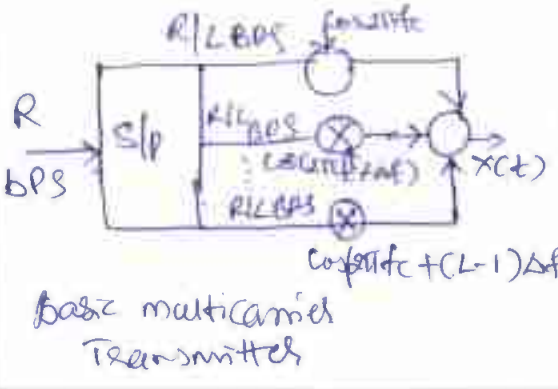
Scheme & Solutions

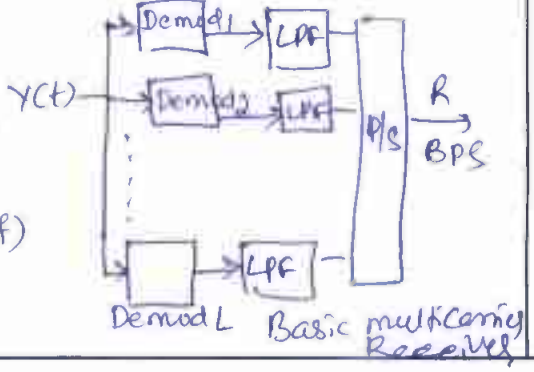
Signature of Scrutinizer

Subject Title : WC & LTE 4G Broadband **Subject Code :** 17EC81

Question Number	Solution	Marks Allocated
1 (a)	Explaining any 6 advantages $1\frac{1}{2} \times 6 = 8$	8
(b)	Explaining ANY 5M + 3M for Block diagram 	8
(c)	Explaining path loss 3M + 1M for figure -	4
2 (a)	Explaining flat architecture 5M + 3M for figure OR	8
(b)	Explaing Delay spread 4M + Coherence BW 4M	8
(c)	(2) Advantages (i) effective & practical approach to the OCI problem (ii) Increases system capacity (2m) (2) Disadvantages (i) Increases no. of antennas (ii) reduces trunking efficiency (iii) Increases overheads (2m)	4
2-3 (a)	→ Basic multicarrier Transmitter Explaination 2M " " Receiver " 2M " " Transmitter Block diagram 2M " " Receiver Block diagram 2M	8



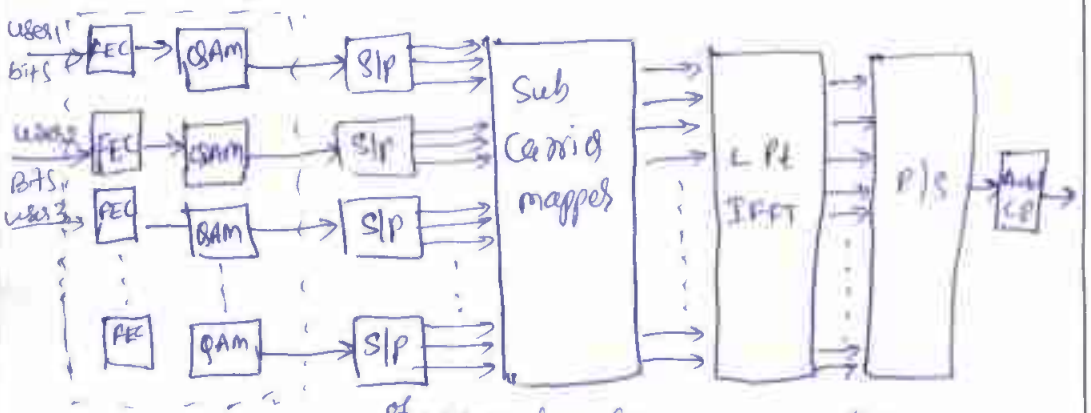
Basic multicarrier Transmitter



Basic multicarrier Receiver

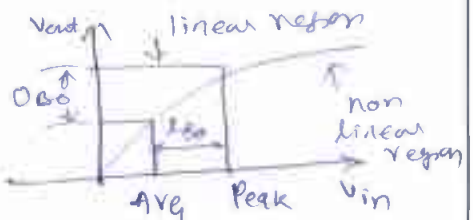
Subject Title : WC & LTE 4G Broadband Subject Code : 17EC81

Question Number	Solution	Marks Allocated
3(b)	Explaining operation of OFDM downlink transmitter 5M and Blockdiagram 3M.	8



Blockdiag of OFDM downlink transmitter

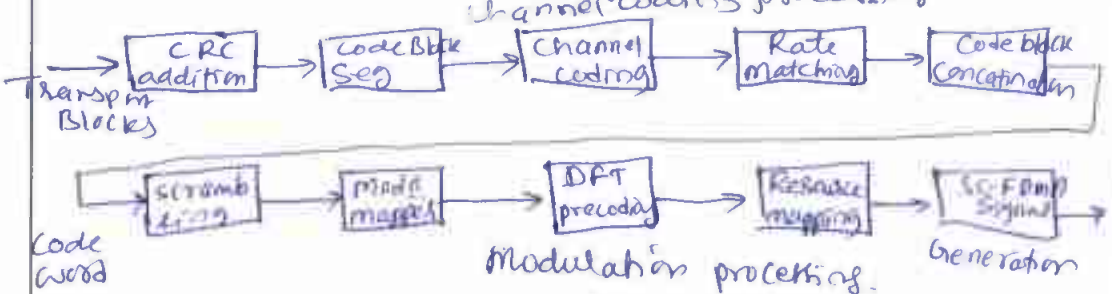
C	Any four differences 1X4		4
	V Blast	D Blast	
(i)	Simpler architecture	(i) Complex architecture	
(ii)	Vertical Blast	(ii) Diagonal Blast	
(iii)	Reduces inefficiency	(iii) inefficiency cannot be reduced.	
(iv)	less computational complexity	(iv) more computational complexity	
(v)	Horizontally layered coding structure	(v) Diagonally layered coding structure	
	OR		
3(c)(a)	Explaining PAR 6M+2M for Power Ampr response - OFDM signals have high PAR - High PAR reduces efficiency & increase cost of RF power Ampr. - High Back off reduces the power η of HPA. - $IBO = 10\log_{10}\frac{Pinsat}{Pin}$		8



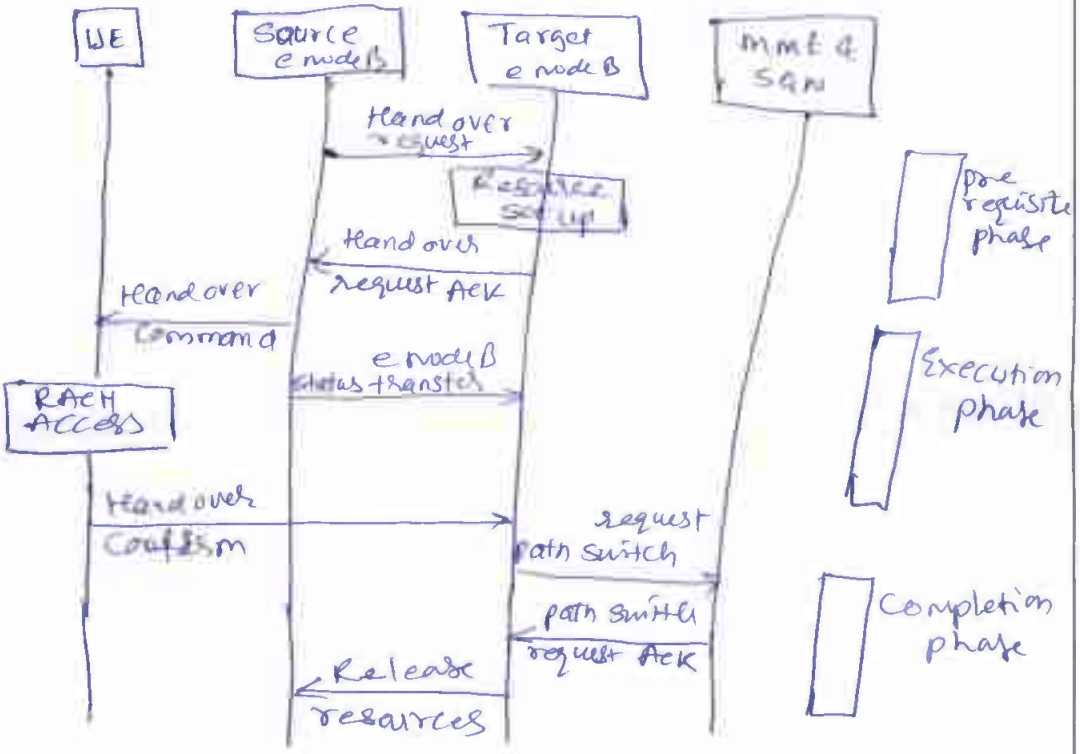
Power ampr response

b	Explaining uplink transmitter of SCFDMA 2M+2M for transmitter figure Explaining uplink receiver 2M+2M for Blockdiagram		8

Subject Title : IMC & LTE 4G Broadband **Subject Code :** 17EC81

Question Number	Solution	Marks Allocated
4 C	Comparing OFDMA & SCFDMA any four 1X4 OFDM - provides high performance - less dispersive spectrum - Noise amplification is isolated - more popular - high PAPR SCFDE - Relatively less performance - nominally more dispersive spectrum - Noise amplification not isolated, less popular - Low PAPR	4
Q-5(a)	Explaining Downlink transport channels $1\frac{1}{2} \times 4 = 6$ DLSCH, BCH, MCH, PCH Explaining uplink transport channels $1 \times 2 = 2$ ULSCH, RACH.	8
(b)	Explaining type 1 Frame structure 2M + 2M figure = 4 " type 2 " 2M + 2M figure = 4	8
(c)	Explaining BCH or BCCH 2M + 2M for PBCH	4
Q 6 (a)	Explaining LTE architecture - 5M + 3M architecture figure OR	8
(b)	Explaining RRC, PDCR, RLC, MAC & Phy 1X5M + 3M for stack figure	8
(c)	Explaining ULSCH and RACH 2+2 = 4M	4
Q-7(a)	Explaining (i) Demodulation (ii). Sounding : reference signals 4+4 = 8M	8
(b)	Explaining uplink transport channel processing 5M + 3M for Block diagram 	8
(c)	Explaining BSR - 4M. - BSR sent UE to serving enode B. - useful for uplink scheduling process - BSR Triggering event	4

Subject Title : WC&4G LTE Broadband Subject Code : 17EC81

Question Number	Solution	Marks Allocated
Q-8 a	Explaining cell search procedure 6M + 2M for figure OR Detection of symbol timing, offset, cell ID index ↓ Detection of frame timing and cell ID group Index ↓ Detection of other system information from PBCH	8
(b)	Explaining Step 1: Random Access preamble transmission Step 2: Random access response Step 3: Scheduled transmission Step 4: contension resolution. } 2M = 8	8
(c)	Explaining periodic & aperiodic CQI report 2+2=4	4
Q-9 (a)	Explaining RRC idle & RRC connection 3+3 = 6M SRB & MIB function of RRC 2M	8
(b)	Explaining X_2 interface - 5M + 3M for figure	8
		
C	Explaining ~~FM~~ ~~AM~~ any two data transfer modes TM UM & AM. 2+2 4	4
	OR	
Q 10 (a)	Explaining A, tu A5 5M + B_1 & B_2 $1\frac{1}{2} \times 2 = 3M$ of RAN procedures.	8

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Question Number	Solution	Marks Allocated
(b)	Services & function of RLC UM (i) Transfering & receiving PDU's from upper layer (ii) error correction through ARQ (iii) Concatination & segmentation (iv) Re-segmentation of RLC data PDUs (v) In sequence delivery of Upper layer PDU (vi) Duplicate detection (vii) RLC SDU discard (viii) RL (Re establishment (ix) protocol error detection. Services & functions of MAC - UM (i) Mapping betn Logical & Transport Channel (ii) Multiplexing / Demultiplexing (iii) Scheduling of uplink & downlink transmission (iv) error Correction through HRQ (v) priority handling (vi) Transport format selection	8
(c)	Explaining paging used in RRC protocol UM - It is a connection control function of RRC protocol - used to inform the UE's in the RRC idle or RRC connected - Detects incoming calls - E-UTRan initiates the paging procedure	4

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