Visvesvaraya Technological University, Belagavi

MODEL QUESTION PAPER

4th Semester, MTech (CBCS)EC/TC

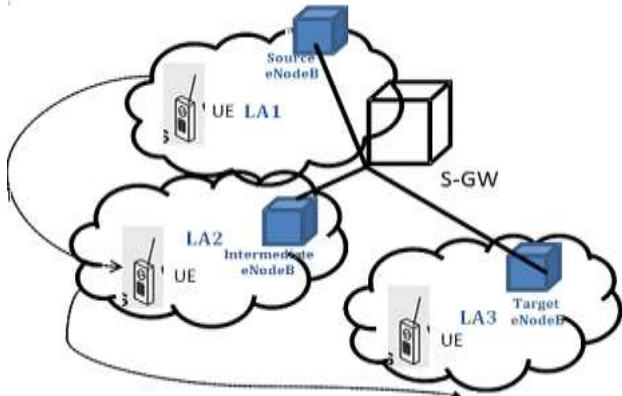**Course: 16ECS41- Wireless Broadband LTE-4G**

Time: 3 Hours   **Max. Marks: 80**

Note: (i) Answer Five full questions selecting any one full question from each Module.
(ii) Question on a topic of a Module may appear in either its 1st or/and 2nd question.

		Module-1	**Marks**
1	a	How does policy control and charging work in LTE?	6
	b	Identify the Serving Gate Way connections to other logical nodes and the main functions.	6
	c	Compare the QoS parameters for the LTE with HSPA.	4
		OR	
2	a	With a system architecture diagram, explain the IP multimedia services subsystem architecture.	8
	b	What are trusted and Un-trusted non-3GPP access network? Give examples for the same.	4
	c	List the main technology components in LTE advanced.	4
		Module-2	
3	a	Explain the sequence modulator to transmit periodic CQI on PUCCH.	4
	b	What is contention based and non-contention based random access procedures.	4
	c	Discuss the physical layer procedures - power control, timing advance and random access in a LTE system.	8
		OR	
4	a	Consider an OFDM system with total passband bandwidth B=4MHz with N=512. The channel has a maximum delay spread of Td=4µs. i. What is the symbol time of a corresponding single –carrier system? ii. What is the sample time the OFDM system and the raw symbol time without the cyclic prefix? iii. Calculate the number of samples in CP? If it employs a cyclic prefix which is	8

		10% of the symbol time.	
		iv. What is the loss in efficiency due to the overhead of the cyclic prefix?	
	b	For a LTE – FDD access and frame structure explain uplink data transmission with resource allocation and PUSCH channel coding chain.	8
		Module-3	
5	a	With MAC PDU structure and payload types, explain how Data flow is handled at the MAC layer?	6
	b	The LTE Layer 2 RLC protocol has to deliver the packets in sequence and provide the retransmission of payload data units (PDU). Decide the RLC mode of operation and explain the same with block diagram.	6
	c	Explain about the downlink direction control information to be carried in the MAC control elements.	4
		OR	
6	a	With a block diagram explain the packet data convergence protocol (PDCP) layer operations for PDCP service data units.	8
	b	What is meant by Minimization of Drive Tests (MDT). Show the steps for MDT idle –mode operation.	4
	c	How load control and the interference are managed at the X2- interface.	4
		Module-4	
7	a	A person with UE moves from LA1 to LA3 through LA2. List the set of MAP procedures for handover preparation, handover evaluation and handover completion.	8
	b	Identify the factors to determine the handover frequency in a cellular network.	4
	c	List the main differences between E-UTRAN and UTRAN Mobility.	4
		OR	
8	a	Illustrate selection, reselection process and automatic neighbor list generation for the UE in the idle mode mobility.	10

	b	Explain with schematic the Intra-frequency handover procedure.	10
		Module-5	
9	a	Illustrate the single-carrier constraint to frequency domain packet scheduling in uplink and Inter-working between packet scheduling, link adaptation unit, and other uplink RRM functionalities.	8
	b	Consider a multi -antenna system with L=2 receive antennas. What is the approximate SNR required to achieve a BER of 10^{-6} in this wireless system?	4
	c	Discuss the impact of transmission bandwidth and Mobile Speed on uplink level performance.	4
		OR	

10	a	Explain the meaning of the terms
		
		    i. Discontinuous transmission and reception in LTE system
		    ii. Frequency domain packet scheduling
			8

	b	Consider a MIMO channel matrix H given below $$\begin{matrix} 2 & -6 & 0 \\ 3 & 4 & 0 \\ 0 & 0 & 2 \end{matrix}$$ Considering a transmit power of P= -1.25dBm and noise power σ_n^2=3dBm, compute the MIMO capacity.	8

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