Time: 3 Hours **Marks: 80**

Note:

1. **Question No. 1 is compulsory**.
2. Attempt any **THREE** out of the remaining **FIVE** questions.
3. Assume suitable data if necessary.

Q. 1. Attempt any **Four.**

	(a)	State the main features of 5 G technology.	**5**
	(b)	Why radio signals on frequencies between 30 GHz and 300 GHz are called millimetre waves?	**5**
	(c)	What is the need of CP in OFDM? How CP is added in the OFDM system.	**5**
	(d)	List the important characteristics and benefits of C-RAN.	**5**
	(e)	Does Massive MIMO enhance the performance of 5G? Justify your answer.	**5**
Q. 2.	**(a)**	Why carrier aggregation is performed? Explain the type of carrier aggregation techniques.	**10**
	(b)	Explain CD NOMA/ SCMA with suitable illustrations. What are the characteristics of codebook used in SCMA?	**10**
Q. 3.	**(a)**	Draw the 5G Reference point architecture? Explain the function of AMF, UPF & PCF and List the various interfaces associated with these network functions.	**10**
	(b)	Draw and explain the Cognitive Radio Function cycle with important features.	**10**
Q. 4.	**(a)**	List the various millimetre wave technology employed to mitigate the effect of multipath fading, human shadowing, rains etc.	**10**
	(b)	How DFT-S-OFDM is different from CP OFDM / OFDM? Explain DFT-S-OFDM with suitable illustration.	**10**
Q.5	**(a)**	Explain various interference management techniques in CR and heterogeneous Networks.	**10**
	(b)	What is direct conversion transceiver architecture? Explain with suitable illustrations.	
Q. 6	**(a)**	What is green small cell cellular network ? What are the various energy saving techniques by keeping BS in sleep modes.	**10**
	(b)	List the various system structures of C-RAN based on BBU and RRU functionalities.	**10**

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