Sub Code: EC803D **ROLL NO……..……..**

EVEN SEMESTER EXAMINATION, 2023 – 24

4th Year B.Tech. – Electronics & Communication Engineering

SDN and Cognitive Radio

Duration: 3:00 hrs **Max Marks: 100**

Note: - Attempt all questions. All Questions carry equal marks. In case of any ambiguity or missing data, the same may be assumed and state the assumption made in the answer.

Q 1.	**Answer any four parts of the following.** **a)** Explain the characteristics and implementation challenges of linear time-invariant systems described by difference equations. **b)** Discuss the stability and causality of discrete-time systems. How are these properties determined? **c)** Describe the frequency domain representation of discrete-time signals. Why is it significant in signal processing? **d)** What is Network Functions Virtualization (NFV)? Write various application of SDN in detail. **e)** Explain the concept of circular convolution. How does it differ from linear convolution? **f)** What is Programmable Network? Explain the various characteristics of SDN in detail.	**5x4=20**
Q 2.	**Answer any four parts of the following.** **a)** Solve a sample difference equation and explain the methodology. **b)** Derive the frequency response of a given discrete-time system. **c)** What is Cognitive Radio? What is the new application enabled by CR? **d)** Write the various steps involved in the reception of the signal in SDR. **e)** Describe the process and significance of decimation in frequency algorithm in FFT. **f)** Detail the steps involved in designing a FIR filter using windowing techniques. Provide examples of different types of windows used.	**5x4=20**
Q 3.	**Answer any two parts of the following.** **a)** Provide a comprehensive overview of the analysis of discrete-time linear time-invariant systems. Include discussions on the role of stability and causality. **b)** Examine how signals are acquired in Cognitive radio, and explain about sensing mechanisms **c)** Demonstrate the Conceptual model for cognitive radios with location and environment awareness cycles.	**10x2= 20**
Q 4.	**Answer any two parts of the following.** **a)** Elaborate on the design considerations and steps in creating IIR digital filters. Discuss the implications of impulse invariant and bilinear transformation. **b)** Elaborate the primary functions, components and design rules of cognitive Radio **c)** Analyze the impact of filter design choices on the performance of digital signal processing systems.	**10x2= 20**
Q 5.	**Answer any two parts of the following.** **a)** Write Short notes on: i) Software Defined Network (SDN) Controllers ii) Active Networking iii) Mininet simulation environment **b)** Discuss the application of the z-transform in real-world digital signal processing scenarios. **c)** Provide a detailed explanation and example of the design process for FIR filters using the windowing technique.	**10x2= 20**

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