

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2024

PhD- I Semester (ECE)

COURSE CODE (CREDITS): 18PIWGE101(3)

MAX. MARKS: 25

COURSE NAME: RESEARCH METHODOLOGIES INCLUDING QUANTITATIVE  
METHODS AND COMPUTER APPLICATIONS

COURSE INSTRUCTORS: Dr. Alok Kumar

MAX. TIME: 2 Hours

*Note: (a) All questions are compulsory.*

*(b) The candidate is allowed to make Suitable numeric assumptions wherever required  
for solving problems*

Q.No	Question	Marks
Q1	How does spectrum management differ in 6G compared to earlier generations of wireless networks? What are the roles of cognitive radio in addressing the challenges of spectrum scarcity in 6G? Discuss the importance of dynamic spectrum access (DSA) in 6G networks. How does cognitive radio enable this?	5
Q.2	Explain Cognitive cycle in cognitive radio network (CRN). What are the research challenges occurs in spectrum sensing, spectrum analysis and decision, and spectrum mobility process?	5
Q.3	Define spectrum sensing and explain its importance in cognitive radio networks. What are the different types of spectrum sensing techniques? Compare energy detection, matched filtering, and cyclostationary feature detection.	5
Q.4	What is Cooperative Spectrum Sensing (CSS), and why is it important in Cognitive Radio Networks? Discuss the role of the Fusion Center (FC) in CSS. How does it aggregate sensing data from multiple CR users? What are the primary challenges in implementing CSS in real-world scenarios?	5
Q.5	What are the main challenges in implementing cognitive radio systems in real-world scenarios? How can machine learning techniques improve the efficiency of spectrum sensing in cognitive radio systems? What are the key research challenges in developing cognitive radio for 6G networks?	5