

Name :
Reg No :

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**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
07 THRISSUR CLUSTER**

**THIRD SEMESTER M.TECH. DEGREE EXAMINATION DEC 2017
Electronics & Communication Engineering
Communication Engineering & Signal Processing
07EC7203 COGNITIVE & SOFTWARE DEFINED RADIO**

Time : 3 hours

Max.Marks: 60

Answer all six questions. Part 'a' of each question is compulsory.

Answer either part 'b' or part 'c' of each question

| Q.no. | Module 1 | Marks |
|--------------|---|--------------|
| 1a | a) How is a Cognitive Radio different from SDR? | 4 |
| | Answer b or c | |
| b | Can a conventional mobile phone be considered as an SDR? Justify your answer | 5 |
| c | Write note on technology tradeoffs and architecture implications of SDR | 5 |
| Q.no. | Module 2 | Marks |
| 2a | What are the steps involved in data transmission in an SDR transmitter? | 4 |
| | Answer b or c | |
| b | Give the functional architecture of an SDR | 5 |
| c | Give a complete block schematic of an SDR physical layer. | 5 |
| Q.no. | Module 3 | Marks |
| 3a | Explain a generic Cognitive Radio with a block schematic | 4 |
| | Answer b or c | |
| b | Explain the terms associated with Cognitive radio i) Spectrum Mobility ii White Space Database iii) Hidden-node problem | 5 |
| c | Differentiate the different Cognitive behaviours , with illustration. Give the capacity expressions in each case | 5 |
| Q.no. | Module 4 | Marks |
| 4a | Write notes ULLA, CAPRI, NKRL | 4 |

Answer b or c

- b** A Primary User transmits at 40 dBm over 5 MHz bandwidth. A Secondary user has a maximum transmit power 20 dBm. If the channel noise psd is 10^{-9} W/Hz in all cases, calculate the Capacity that the Primary User and secondary User achieve with Underlay and overlay modes when
a.)SU receiver is within PU's range b). SU receiver is outside PU's range.[
Assume necessary parameters, if required]
- c** Give the CRM based framework for cognitive radio network

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| Q.no. | Module 5 | Marks |
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| 5a | What is spectrum sensing? Explain any one method of spectrum sensing | 5 |
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Answer b or c

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| b | Explain Cognition cycle | 7 |
| c | Write note on Inference Hierarchy | 7 |

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| Q.no. | Module 6 | Marks |
|--------------|-----------------|--------------|

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| 6a | Comment about the challenges that existing cellular networks face and mention how they are solved in 5g. | 5 |
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Answer b or c

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| b | Explain Next Gen 5g networks with block schematic | 7 |
| c | Explain C-RAN with centralised architecture | 7 |