Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **17CS3029** | **Duration :** | **3hrs** |
| **Sub. Name :** | **WIRELESS SENSOR NETWORKS** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | In health monitoring, inspection techniques are classified into global and local inspection techniques. Explain the difference between these techniques. For which of these techniques are wireless sensor networks suitable? | CO1 | 5 |
| b. | The usage of multiple communication hops instead of a single hop affects the overall energy consumption. Describe other advantages or disadvantages of multi-hop communications in terms of performance latency, throughput, reliability, and security. | CO2 | 5 |
| c. | Most applications in wireless sensor networks extract time and space domain features to detect interesting events. Define the following features with an example: Autocorrelation function, Correlation coefficients, and Cross-correlation function. | CO2 | 10 |
| **(OR)** | | | | |
| 2. | a. | Name any four techniques to reduce power consumption in wireless sensor networks and explain each with an application. | CO2 | 10 |
| b. | Explain any two category 1 (C1) sensor network applications. | CO2 | 10 |
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| 3. | a. | While dynamic memory management is very useful, it cannot be supported in wireless sensor networks. Jusify with your answer. | CO2 | 2 |
|  | b. | A large number of commercially available wireless sensor nodes integrate three types of memory architectures: EEPROM (flash memory), RAM and ROM. Explain the purpose of each of them. | CO3 | 6 |
|  | c. | While they are not most energy-efficient, microcontrollers are the predominant processors in wireless sensor networks. Explain some of the reasons. | CO3 | 2 |
|  | d. | Explain the generic protocol stack of sensor networks. | CO1 | 10 |
| **(OR)** | | | | |
| 4. | a. | Explain radio propagation modes and available wireless technologies for WSN applications. | CO4 | 10 |
|  | b. | Define hidden and open terminal problems and demonstrate their performance in WSN applications. | CO5 | 10 |
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| 5. |  | Five requirements of MAC protocols for WSN: energy efficiency, scalability, adaptability, low latency, and reliability. Describe a concrete WSN application for each of these five requirements where the requirement would be more important than the other. | CO4 | 20 |
| **(OR)** | | | | |
| 6. | a. | Does the S-MAC protocol reduces the duty cycle of sensor node? Explain how S-MAC protocols attempt to reduce collisions. Name at least three disadvantages of the S-MAC protocol. | CO6 | 10 |
|  | b. | Discuss the cluster head election policy in the LEACH protocol and explain how LEACH can consider available energy on each node in this election process. Explain the problem with this energy-aware election policy. | CO6 | 10 |
|  |  |  |  |  |
| 7. |  | Consider routing attacks such as selective forwarding, sinkhole, blackhole, Sybil, rushing, and wormhole attacks. Describe briefly each type of attack and discuss how these attacks could take place in WSN. | CO5 | 20 |
| **(OR)** | | | | |
| 8. |  | TCP can be classified as either connection-oriented or connectionless. Describe the different phases of connection-oriented and connectionless protocol operation with an example. | CO4 | 20 |
|  | | **Compulsory**: |  |  |
| 9. |  | Conisder the concept of GPS in WSN localization and answer the following questions: |  |  |
| a. | Three satellites are enough to obtain a position of a node. Explain. | CO5 | 5 |
| b. | It is preferred to have at least four satellites for accurate localization. Discuss. | CO5 | 5 |
| c. | Explain the purpose of the monitor stations and the master control station. | CO5 | 5 |
| d. | It is not feasible to have all wireless sensor nodes equipped with a GPS receiver. Justify. | CO5 | 5 |