FACULTY OF ENGINEERING
B.E. 4/4 (ECE) II - Semester (Main) Examination May 2017

Subject: Radar and Satellite Communication
Max. Marks: 75

Note: Answer all questions from Part-A and answer any five questions from Part-B.

PART-A (25 Marks)
1) Give principle of Radar and define range to target. [3]
2) Give at least four applications of Radar. [2]
3) Write briefly about Radar Cross section of sphere. [2]
4) Explain the operation of three types of radar displays. [3]
5) Describe non coherent MTI. [3]
6) Describe Kepler's laws of planetary motion. [3]
7) Differentiate geo-synchronous and geo-stationary orbits. [2]
8) Describe briefly spacecraft antennas. [3]
9) Is uplink frequency is higher than downlink frequency? If so why? [2]
10) Describe briefly different orbital perturbations. [2]

PART – B (50 Marks)
11)(a) Derive simple Radar equation. [5]
    (b) Give block diagram of Radar and explain its operation. [5]

12)(a) What is probability of false alarm and probability of detection? [5]
    (b) What is meant by minimum detectable signal in radar? Derive the expression
        for receiver noise and minimum detectable signal. [5]

13)(a) Obtain an expression for Doppler frequency and Compute the Doppler frequency
        measured by the Air born radar with following specifications: \( V_{\text{radar}} = 250 \text{ m/sec} \),
        \( \lambda = 0.03 \text{ m} \). Line of sight target approaching with 175 m/sec. [5]
    (b) Explain how Doppler direction is identified with FMCW radar and derive an
        expression for range and Doppler measurement. [5]

14)(a) What is blind speed in MTI Radar? In MTI radar the pulse repetition frequency is
        200 Hz and the carrier transmission frequency is 100 MHz. Find its first, blind
        speed. [5]
    (b) Compare the performance characteristics of FDMA, TDMA and CDMA. [5]

15) (a) What are spacecraft subsystems? [5]
    (b) Describe different types of Transponders used in the satellite. [6]

16)(a) Derive an expression for power received in a satellite link including all losses. [6]
    (b) Derive an expression for C/N ratio in terms of the figure of merit of an earth
        station. [6]

17) Explain the design of satellite down and uplink with an example. [10]
PART – A (25 Marks)
1. Define Kernel. Mention different types of Kernels. 3
2. Explain any two important reasons for usage of operating system for an electronic system. 2
3. Differentiate between Shortest Jump First (SJF) algorithm and Round Robin scheduling algorithm. 2
4. Mention any two notable advantages of Thread Scheduling. 3
5. Define semaphore. When do we recommend using it? 2
6. Mention the solution adopted for dining philosopher's problem. 3
7. Differentiate First-fit Vs Best-fit memory allocation algorithms. 3
8. Mention different page replacement policies available in RTOS. 2
9. Mention any three notable features of VxWorks RTOS. 3
10. Write any two main aspects of choosing a RTOS for an electronic system design. 2

PART – B (50 Marks)
11. a) What is Real Time Operating System? Differentiate between General Purpose Operating System and Real Time Operating System. 5
   b) Describe in brief about the interaction of Operating System with the underlying hardware. 5

12. a) Differentiate priority and non-priority based scheduling of multi-tasking with a neat timing diagram. 5
    b) State Shortest Jump First (SJF) algorithm and explain with a neat timing diagram. 5

13. a) What is deadlock problem? When it will occur? Explain with an example. 5
    b) Describe in brief about Producer-Consumer problem and strategy being adopted. 5

14. a) Explain various memory allocation techniques available for tasks in RTOS. 6
    b) Write in detail about the LRU page replacement policy. 4

15. a) Explain usage of RTOS for Fault Tolerant Applications with an example. 5
    b) With the kernel diagram, mention in brief about μC/OS-II RTOS. 5

16. a) Write short notes on UNIX multilevel feedback scheduling. 5
    b) Write a short note on FCFS, C-SCAN disk scheduling algorithms. 5

17. Write any Two of the following:
   a) Write a short notes on various task states and task state transitions 5
   b) Explain how messages are getting passed among the created tasks in RTOS 5
   c) Write in brief about shared resource problem with an example 5