POKHARA UNIVERSITY

Level: Bachelor Semester: Spring Year : 2019
Programme: BE Full Marks: 100
Course: Real Time Systems Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) How would you differentiate a Real time System from a non-Real time System? Explain with some examples. 7
   b) What is response time and what is its significance in case of Real time Systems? Explain with an example. 8
2. a) What are different techniques used for specification of Real time systems? Explain any one in brief. 8
   b) How does Rate Monotonic Analysis (RMA) policy schedule a set of Real time Tasks? Draw a time line to show the execution of two tasks using RMA Scheduling policy with the following parameters: 7
   Task T_1 with an execution time of 1 unit, periodicity of 4 units and Task T_2 with an execution time of 3 units, periodicity of 5 units, in both cases assume that both the tasks are released at time 0.
3. a) What is the role of the kernel of a Real time operating system? Explain different types of pseudo-kernels. 8
   b) How can inefficient memory management hamper the performance of a Real time System? Explain different techniques that can be used for Real time Memory Management. 7
4. a) What do you mean by Priority Inversion? Draw a figure (time line) for a scenario with three tasks T_1, T2, T_3 to demonstrate Priority Inversion occurring in a system. How can this scenario be worsened by Unbounded Priority Inversion. 7
   b) Why do you think it is necessary to analyze response time of Real time tasks in a system? Explain with an example how do you perform response time analysis for fixed period systems? 8

5. a) What is a Fault Tolerant system? How can the use of check points increase fault tolerance in a Real time System? 8
   b) How can Scaled Numbers be used for optimizing the performance of a Real time System? Explain with an example. 7
6. a) Explain the problems that may arise during the integration of a Real time System, what strategy can be used for proper integration of a Real time System? 7
   b) What is POSIX and why is it required? How can multi-threaded applications be developed using POSIX compliant APIs? 8
7. Write short notes on: (**Any two**) 2×5
   a) POSIX Semaphores
   b) Response time Analysis of Round Robin Systems
   c) Preemptive Priority Systems