



KOGI STATE UNIVERSITY, KABBA
FACULTY OF SCIENCE AND COMPUTING (Department of Computer Science)
KSUK-COS 234: System Performance Evaluation
Session: 2024/2025, Semester: Second **Date: 11/08/2025** **Time allowed: 2 Hours**
Instructions: Answer Question 1 and any other Two Questions

1(a) Given that the arrival and service rates of an M/M/1 queue are 25 processes per second and 100 processes per second respectively. Calculate: (i) Server Utilization [2 marks] (ii) Average number of customers in the system [2 marks] (iii) Average number of customers in the queue [2 marks] (iv) Average time a customer spends in the system [2 marks] (v) Average time a customer spends in the queue [2 marks]

(b) Define M/M/1 queue and state the meaning of the notations in "M/M/1". [4 marks]

(c) (i) List and explain any three practical applications of M/M/1 queue [6 marks]
[Any 3; 2 marks each - 6 marks]

(ii) List any four key assumptions of the M/M/1 queue model? [4 marks]

2(a) (i) In not more than 3 sentences, state what you understand by computer system performance evaluation and state the goals of computer performance evaluation. [5 marks]

(b) State and explain the tasks in computer system performance evaluation. [10 marks]

(c) You suggest that your organization carry regular performance evaluation on hardware, software and applications to assess their effectiveness and efficiency. However, your director has a contrary opinion because he believes that the pre-delivery evaluation carried out by manufacturers is sufficient. Provide justifications for performance evaluation in a bid to persuade your director. [8 marks]

3(a) You are a member of the computer system performance evaluation team at ABC Corporation. Your role is to evaluate the daily performance of hardware, software and applications used in the E-commerce department of the organization. Identify and explain the relevant parameters you will use to accomplish your tasks. [10 marks]

(b)(i) List three factors that determine the turnaround time [3 marks]

(ii) Distinguish between turnaround time and waiting time. [2½ marks]

(c) A process arrives in the CPU at 10.55am and finishes execution at 10.59 am.

(i) Calculate the turnaround time.

(ii) If the program bursts at 10.57am, calculate the waiting time

(iii) Calculate the turnaround time in terms of waiting time and burst time

4(a) Define simulation and state any two strengths of simulation. [3 marks]

(b) Discuss the components of discrete event simulation. [6 marks]

- (c)(i) Define empirical or testbed analysis and state its major strength. [2 marks]
(ii) List and explain the tools used for simulation [6 marks]
(ii) Give any two examples of ways that simulation can be used for computer system performance evaluation. [2 marks]
(ii) What are the strengths and limitations of analytical models? [4 marks]

- 5(a) Explain briefly what you understand by the following terms (i) error [2 marks] (ii) fault [2 marks] (iii) failure [2 marks] (iv) validation [2 marks] (v) verification [2 marks] (vi) accreditation [2 marks]
(b) (i) Do you consider turnaround time a useful parameter for computer system performance evaluation? Justify your answer. [7 marks]
(ii) Does turnaround time have any shortcoming? Provide justifications for your answer. [4 marks]

Total mark for Q5= 23