



The University of Fiji



Undergraduate Programme
Department of Computer Science & Information Technology
Semester 1 Year 2017

FINAL COURSE EXAMINATION PAPER

ITC 203 – SYSTEM & SOFTWARE ARCHITECTURE

Important Instructions to Students:

1. Read the questions, instructions carefully and answer the questions.
2. You are allowed an **extra 10 minutes reading time** (during this time, you are not allowed to write with pen) and **180 minutes (3 Hours) to complete this paper**.
3. Silent, non-programmable calculators are allowed, but not supplied.
4. Write all your answers in the answer booklet provided. If you need extra sheets, please ask from the supervisor. Write your name, course code and student identification number in the answer booklet and in the attendance sheet.
5. **This Final Course Examination Paper is worth 100 marks contributes 50% of the total course assessments.**
6. This paper contains two (2) sections.
7. Write all your answers legibly. The marker has the right to award zero for answers that are not legible.
8. This is a **Closed Book Examination**. The University views plagiarism, cheating and dishonest practice as serious offences and if found, offenders are penalized.

Examination Paper Content (Format):

<u>Section</u>	<u>Question</u>	<u>Content</u>	<u>Marks</u>	<u>Suggested Time</u>
A	1-25	Multiple Choice Questions	25	36 Minutes
B	1-8	Short Answer Questions	75	144 Minutes
		TOTAL	100	180 Minutes

All questions in this section are compulsory.

1. When developing an information system, IS professionals follow a series of steps called a _____.
 - a. project life cycle
 - b. systems development life cycle
 - c. project development life cycle
 - d. service development life cycle

2. The ____ discipline of the UP includes all activities for building, acquiring, and integrating application software components.
 - a. implementation
 - b. design
 - c. architecture
 - d. requirements

3. A simple definition of a computer is a device that can accept numeric inputs, perform computational functions, and _____.
 - a. communicate results
 - b. solve formulas
 - c. store data on disk or flash RAM
 - d. detect quantum storage states

4. Early mechanical computation devices were built to perform _____.
 - a. text processing
 - b. mathematical simulation
 - c. repetitive mathematical calculations
 - d. repetitive text operations

5. In a ____, each digit can have only one of two possible values: 0 or 1.
 - a. decimal number
 - b. hexadecimal number
 - c. binary number
 - d. unary number

6. Binary numbers are well suited to computer processing because they correspond directly with values in ____ logic.
 - a. Newton
 - b. Boolean
 - c. Turing
 - d. standard

7. The ____ section of the CPU performs all computation and comparison operations.
- a. register
 - b. ALU
 - c. shifter
 - d. control unit
8. A(n) ____ directs the CPU to route electrical signals representing data inputs through predefined processing circuits that implement the appropriate function.
- a. operation
 - b. process
 - c. instruction
 - d. cycle
9. The ____ is the device or substance that actually holds data.
- a. storage device
 - b. storage medium
 - c. storage method
 - d. storage speed
10. A storage device or medium is ____ if it holds data without loss over long periods.
- a. volatile
 - b. dynamic
 - c. nonvolatile
 - d. archival
11. A ____ is a shared electrical or optical channel that connects two or more devices.
- a. trace
 - b. bus
 - c. route
 - d. connection
12. The ____ governs the format, content, and timing of data, memory addresses, and control messages sent across the bus.
- a. bus clock
 - b. bus size
 - c. bus
protocol
 - d. bus master

13. The number of distinct colors or gray shades that can be displayed is sometimes called the ____.
- a. resolution
 - b. palette
 - c. range
 - d. chromatic depth
14. ____ is a process that generates color approximations by placing small dots of different colors in an interlocking pattern.
- a. Merging
 - b. Banding
 - c. Dithering
 - d. Retracing
15. A complete ____ of a sine wave follows its full range from zero to positive peak, back to zero, to its negative peak, and then back to zero again.
- a. cycle
 - b. wave
 - c. crest
 - d. trough
16. ____ is a technique for embedding multiple bit values in a single wave characteristic, such as frequency or amplitude.
- a. Polymorphic coding
 - b. Unilateral coding
 - c. Multilevel coding
 - d. Dynamic coding
17. The term ____ refers to the spatial organization of network devices, physical routing of network cabling, and flow of messages from one network node to another.
- a. network infrastructure
 - b. network topology
 - c. network path
 - d. network interface
18. A network for an entire campus is known as a(n) ____ and includes end nodes, LANs, zone networks, the campus backbone network, and central nodes.
- a. metropolitan area network
 - b. wide area network
 - c. regional network
 - d. enterprise network

19. ____ are integrated collections of models, tools, techniques, and processes.
- a. Software models
 - b. Development strategies
 - c. Development tools
 - d. Development methodologies
20. ____ specify detailed blueprints for software component construction and the interaction between software components and users.
- a. Layout models
 - b. Interaction models
 - c. Design models
 - d. Data models
21. Through the ____ layer, a user or system administrator can run application and OS utility programs and manage system resources, such as files, folders, and I/O devices.
- a. service
 - b. kernel
 - c. hypervisor
 - d. command
22. The ____ of the OS contains thousands of reusable components that provide functions ranging from file and folder manipulation to accessing I/O devices, starting and stopping programs, and creating, moving, and resizing GUI windows.
- a. service layer
 - b. kernel layer
 - c. command layer
 - d. metering layer
23. The collection of system software that performs file and secondary storage management and access functions is known as a ____.
- a. disk management system
 - b. storage management system
 - c. file management system
 - d. control management system
24. On a desktop or laptop computer, a ____ is usually an entire physical secondary storage device, a partition of the device, or a removable storage device such as a DVD or flash drive.
- a. page
 - b. block
 - c. sector
 - d. volume

25. ____ are composed of software components distributed across many computer systems and geographic locations.
- a. Information processes
 - b. Information systems
 - c. Information networks
 - d. Information controls

SECTION B: Short Answer Questions

75 Marks

All questions in this section are compulsory.

Question 1 – Computer Technology & Introduction to Systems Architecture **[5 Marks]**

- A. List two ways that companies earn revenue for Web-based information and services. **[1]**
- B. Describe the different activities and emphases of architectural and detailed design. **[1]**
- C. List two limitations in mechanical computation. **[1]**
- D. Why is the computational capacity/speed of quantum computers much higher than conventional computers for certain types of tasks? Should all computers be quantum computers? **[1]**
- E. Is the term server a computer hardware classification, a mode of computer use, or both? **[1]**

Question 2 – Data Representation & Process Technology and Architecture **[10 Marks]**

- A. List the capabilities that any data and information processor, whether organic, mechanical, electrical, or optical, must have. **[1]**
- B. Why do computers represent data with binary numbers? **[1]**
- C. What is excess notation? What is twos complement notation? Why are they needed? In other words, why can't integer values be represented by ordinary binary numbers? **[2]**
- D. Why doesn't a CPU evaluate the expression 'A' = 'a' as true? **[1]**
- E. Discuss the chain of events that occurs when the CPU executes a program. **[1]**
- F. Identify four activities the control unit performs during the CPU fetch cycle. **[2]**
- G. Discuss the issues with heat with respect to chips. **[1]**
- H. What characteristics of the CPU and primary storage should be balanced to achieve maximum system performance? **[1]**

Question 3 – Data Storage Technology & System Integration and Performance [8 Marks]

- A. List important characteristics among which storage devices and technologies vary. [1]
- B. Explain the two ways that storage device portability is typically implemented. [1]
- C. What are the differences between static and dynamic RAM? [1]
- D. What is the system bus? What are its primary components? [2]
- E. What is an interrupt? How is an interrupt generated? How is it processed? [2]
- F. What is a buffer? Why might one be used? [1]

Question 4 – Input Output Technology & Data and Network Communication Technology [10 Marks]

- A. Describe the relationship between image quality, pixel size, and resolution? [1.5]
- B. Explain the term point size as it relates to fonts. [1]
- C. Of liquid crystal, plasma, LED, and OLED displays, which is best and why? [1]
- D. What is a bitmap? How does a bitmap's chromatic resolution affect its size? [1]
- E. What are the three characteristics of sine waves that can be manipulated to represent data? [1.5]
- F. Describe frequency modulation, amplitude modulation, and phase-shift modulation. [1.5]
- G. How can noise and distortion be introduced into a transmission medium? How does a channel's S/N ratio affect the reliability of data transmission? [1]
- H. Describe simplex, half-duplex, and full-duplex transmission. [1.5]

Question 5 – Computer Networks & Application Development [13 Marks]

- A. List and describe four physical topologies. [2]
 - B. What was ARPANET? [1]
 - C. Describe the service quality problems that can occur in VoIP. Why are these problems so difficult to solve? [1]
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- D. Why were fourth-generation languages developed? [1]
- E. What does a programming language define? [1.5]
- F. List two capabilities of a symbolic debugger. [1]
- G. List three components that an integrated development environment generally includes. [1.5]
- H. What are the differences between source code, object code, and executable code? [1.5]
- I. Explain the what are assemblers, compilers, and interpreters. [1.5]
- J. What's the difference between a front-end CASE tool and a back-end CASE tool? [1]

Question 6 – Operating Systems & File and Secondary Storage Management [12 Marks]

- A. Describe the role of the operating system. [1]
- B. List the three states of an active thread. [1.5]
- C. What is the difference between big endian and little endian? [1]
- D. Describe the functions of the kernel, service, and command layers of an OS. [1.5]
- E. What's the difference between a real resource and a virtual resource? [1]
- F. What is a thread? What resources does it share with other threads in the same process? [1]
- G. List the FMS layers and describe their functions. [2]
- H. What's the difference between the logical and physical structure of a file? What are the advantages of not having an application program interact directly with the physical file structure? [2]
- I. What file types does a file management system usually support? [1]

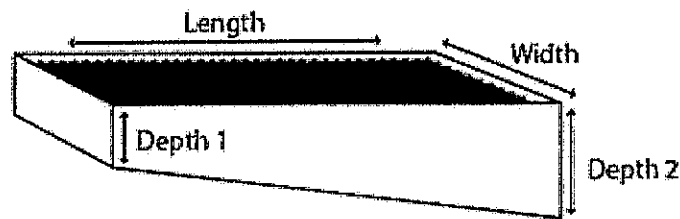
Question 7 – Internet and Distributed Application [10 Marks]

- A. Describe client/server, three-layer, and n-layer architecture. What are the differences between a client and a server? What is the function of each layer in a three-layer application? Why might more than three layers be used? [3]

- B. What is middleware? [1]
- C. Do the terms Internet and Web describe the same thing? [1]
- D. What are the components of a URL? [1]
- E. Describe at least four standard Internet and Web protocols. [2]
- F. Explain the term cloud computing. [2]

Question 8 – Python Programming [7 Marks]

- A. Write a python program to calculate the volume of a swimming pool where Length, Width, Depth 1, and 2 should be entered by the user upon request.
Formula: Volume (Gallons) = Length x Width x Average Depth x 7.5 [2]



- B. Write a python program to ask the user to input, First Name, Middle Name, Last Name, Age, Email Address, and show all the information in order one after the other. [2]
- C. Using the "String Concatenation" theory, combine two sets of strings and show it in the output. The user is required to enter both the string and join them together and show it in output. [2]

StringA = "ITC 203"

StringB = "System and Software Architecture"

Output = "ITC 203: System and Software Architecture"

- D. Explain what is Encryption and Decryption with an example. [1]

