

UNIVERSITY OF RAJSHAHI
Dept. of Computer Science and Engineering
B.SC. ENGINEERING PART-3 (EVEN) EXAMINATION-2021

CSE3212: SOFTWARE ENGINEERING LAB.

Exp1. A popular clothing brand have multiple outlet store and an online store front. They would like to develop a web-based software to operate their outlets and their online store. Prepare basic process flow, UML diagram and ER diagram for the proposed software. Here are the basic customer requirements: :15 marks

- Customer can filter the product searching according to size, gender, age-group, price-range, etc.
- Customer can view current stock availability of a specific product and size at the outlet stores.
- Registered customers will receive rewards for shopping.
- Registered customer can receive their order delivery from the outlet stores without paying any shipping fees.
- All customers have to pay shipping fees to receive home delivery of their order.
- Customers can exchange their product within 15 days of purchase from any outlet store.
- Customers can view and pre-order upcoming products.
- Customers can request an out-of-stock product in a specific size.
- The company may offer limited-time-sale on some products.
- The outlets store keepers will receive rewards based on the sale volume.

UNIVERSITY OF RAJSHAHI
Dept. of Computer Science and Engineering
B.Sc. ENGINEERING PART-3 (EVEN) EXAMINATION-2021

CSE3222: COMPUTER GRAPHICS LAB.

Total marks: 25 [Exam. Marks: 15, Exam Viva: 2.5; Attn.: 2.5; Quiz/Viva(CA):5]

Time: 3 hours

1. Write a program to display Translation, Rotation and Scaling of a 2D object. (7.5)
2. Write a program to draw and display a curve according to Bezier curve drawing algorithm. (7.5)

Affiliated College
Department of Computer Science and Engineering
B.Sc. (Engg.) Part-3 Even Semester Practical Examination-2021
Course: CSE3232 (Microprocessor and Assembly Language Lab)
Marks: Exam-15, Exam Viva-2.5, Quiz/viva(CA)-5, Attn.=2.5, Total=25

[Solve any two problems]

1. Write an assembly language program to implement a searching program that will read a string (a line of letters of English alphabet) and then find out the first capital letter which is occurred first and last capital letter which is occurred last in the alphabetical order. Your program will display a message with “No Capitals” when there is no capital letter in the string.

Sample Input: I Love Bangladesh

Output: First capital=B, Last capital=L

2. Write an assembly language program to implement a counting program that will read a string (a line of characters of letters, digits, punctuation symbols, and others) and then count the number of Vowels and Consonants in the string. Here the count value of each item will be less than 10.

Sample Input: My name is Karim

Output: Vowels=5, Consonants=8

3. Write an assembly language program to implement a sorting program that will read an array of numbers of single decimal digits (from 0 to 9) and then sort the numbers in descending order.

Sample Input: 5 7 3 8 2 9 1 4 6

Output: 9 8 7 6 5 4 3 2 1

Tomorrow
7/10 AM

UNIVERSITY OF RAJSHAHI

Dept. of Computer Science and Engineering

B.Sc. ENGINEERING PART-3 (EVEN) EXAMINATION-2021

COURSE: CSE3242 (OPERATING SYSTEM AND SYSTEM PROGRAMMING LAB.)

Total marks: 25 [Exam. Marks: 15, Exam Viva: 2.5; Attn.: 2.5; Quiz/Viva(CA):5]

Time: 3 hours

1. Write a program to simulate the create, delete, copy and move file operation functions of an operating system. 5
2. Write a program to implement the Banker's algorithm for avoiding deadlock. Hence, show the safe sequence if found. 5
3. Answer any one from the followings- 5
 - i) Write a program to implement LRU page replacement algorithm. [consider, no. of allocated frames is 4]
 - ✓ ii) Write a program to implement FIFO page replacement algorithm. [consider, no. of allocated frames is 4]
 - iii) Write a program to implement Second-Chance page replacement algorithm. [consider, no. of allocated frames is 4]

University of Rajshahi
Dept. of Computer Science and Engineering
B.Sc. Engineering Part-3 (Even) Examination-2021
ICE-3262 [Communication Engineering Lab]

Full Marks: 15

Set-1

- | | | |
|----|---|---|
| 1. | Implement the modulation and demodulation for the Differential Manchester line coding technique. | 5 |
| 2. | Implement the encoding and decoding using B8ZS scrambling technique. | 5 |
| 3. | Implement the modulation and demodulation using ASK . | 5 |

University of Rajshahi
Department of Computer Science and Engineering
B. Sc. (Engg.) Part-III Even Semester Examination 2021
Course: CSE-3211 (Software Engineering)
Full Marks: 52.5 Time: 3(Three) Hours

Answer 06 (Six) questions taking any 03 (Three) from each section

Section-A

- | | | |
|----|---|------|
| 1. | a) Define Software and Software Engineering. | 3 |
| | b) Is software engineering applicable when WebApps are built? If so, how might it be modified to accommodate the unique characteristics of WebApps? | 3 |
| | c) Many modern applications change frequently before they are presented to the end user and then after the first version has been put into use. Suggest a few ways to build software to stop deterioration due to change. | 2.75 |
| 2. | a) What are the major causes of the software crisis? | 2 |
| | b) Write the SDLC phases and the documents they produce. | 2.50 |
| | c) Briefly explain the Incremental process model and its advantages over Waterfall model. | 4.25 |
| 3. | a) Define requirements engineering. State various types of software requirements. | 2.50 |
| | b) Write and briefly explain various requirements engineering tasks. | 4.25 |
| | c) Why is it that many software developers don't pay enough attention to requirements engineering?
Are there ever circumstances where you can skip it? | 2 |
| 4. | a) What are the issues of software project management concerns? | 2 |
| | b) Which factors need to be considered to build a software project team? | 2.25 |
| | c) What are software project metrics? Why it is necessary? | 2.25 |
| | d) Compare size-oriented metrics and function-oriented metrics to measure a software process and product. | 2.25 |

Section-B

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| 5. | a) How the software requirements model could be translated into the design model? | 2.50 |
| | b) Write the characteristics of a good software design. | 3.25 |
| | c) Explain the quality attributes of software design. | 3 |
| 6. | a) State and briefly explain the important design concepts that span software development. | 5 |
| | b) Discuss the layered software architecture with the necessary diagram. | 2.25 |
| | c) Define i) Functional Independence, ii) Cohesion, and iii) Coupling with respect to modular software design. | 1.50 |
| 7. | a) Describe in brief about alpha and beta testing. | 2 |
| | b) What is the main aim of writing a successful test? | 2 |
| | c) State some SQA activities that are encompassed by software verification and validation process. | 2.50 |
| | d) Define smoke testing. Discuss its benefits. | 2.25 |
| 8. | a) What are the technical risk and business risk of a project? | 3 |
| | b) Besides counting errors and defects, are there other countable characteristics of software that imply quality? What are they and can they be measured directly? | 3 |
| | c) Considering each of the four aspects of the cost of quality, which do you think is the most expensive and why? | 2.75 |

University of Rajshahi
Department of Computer Science and Engineering
B.Sc. Engineering Part-III Even Semester Examination 2021
Course: CSE 3221 (Computer Graphics)

Time: 3 Hours

[Answer any three (03) questions from each Section.]

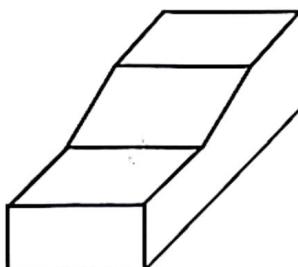
Full Marks: 52.5

Section-A

- | | |
|---|------|
| 1. (a) State and explain Bresenham's line generating algorithm. | 4.75 |
| (b) Given a circle radius $r = 10$. Demonstrate the midpoint circle drawing algorithm determining position along the circle octant in the first quadrant from $x = 0$ to $x = y$. | 4 |
| 2. (a) In two Dimensional Composite transformations, when successive Translation, Rotation and Scaling is performed then mention which one is additive and which one is multiplicative? | 1 |
| (b) Explain the general pivot-point rotation for two dimensional geometric transformations. | 4 |
| (c) With a neat diagram show the sequence of three dimensional fixed point scaling. | 3.75 |
| 3. (a) Describe Cohen-Sutherland line clipping algorithm. | 4.75 |
| (b) Use the Cohen-Sutherland algorithm to clip line $p1(70,20)$ and $p2(100,10)$ against a window lower left hand corner $(50,10)$ and upper right hand corner $(80,40)$. | 4 |
| 4. (a) What do you understand by "Blobby Objects" in three dimensional object representations. | 2.75 |
| (b) Define "Interpolation" and "Approximation" splines. | 2 |
| (c) State and explain the "Hermite interpolation" as a method for interpolating piecewise cubics. | .4 |

Section-B

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|--|------|
| 5. (a) What is meant by Fractal Geometry method? | 1.75 |
| (b) What do you understand by Fractal dimension? Explain with neat diagrams. | 3 |
| (c) Explain the process of Fractal construction by Random midpoint displacement method. | 4 |
| 6. (a) What do you mean by "Object space method" and "Image space method"? | 2 |
| (b) Illustrate and explain in brief the Depth-Buffer method. | 4 |
| (c) Binary Space Partitioning (BSP) tree is an efficient method for determining object visibility. Explain with diagrams. | 2.75 |
| 7. (a) Summarize with neat diagrams, the Transformation from world to viewing co-ordinates for three dimensional viewing. | 2 |
| (b) Explain the term "Vanishing point" for one point perspective projection. | 1.75 |
| (c) Draw and label the diagrams for "Parallelepiped view volume" and "Frustum view volume" in the three dimensional viewing. | 2 |
| (d) Draw the Orthographic projection of the object mentioned below, displaying Plans and elevation views | 3 |



- | | |
|---|------|
| 8. (a) What is color model? Define RGB model. What do you mean by indexed color? | 3 |
| (b) Show and Explain the relationship among RGB, CMY, and HSV color model with necessary diagram. | 3.75 |
| (c) Define dominant "frequency", "saturation", and "chromaticity". | .2 |

Section-A

1. (a) Draw the 8086 architectural diagram and explain the functions of Bus Interface Unit and Execution Unit. 4
 (b) Mention (i) the address capability of 8086 and (ii) how many I/O lines can be accessed by 8086. 2
 (c) Give the steps in physical address generation in 8086 microprocessor. 2.75
2. (a) Briefly discuss how address and data buses of 8086 microprocessor are multiplexed and how those are demultiplexed. 3
 (b) Explain the function of following pins of 8086 microprocessor:
 (i) MN/\overline{MX} , (ii) READY, (iii) ALE, and (iv) DT/R . 4
 (c) What do you understand by memory segmentation of 8086 processor? 1.75
3. (a) Discuss how byte and word data are read from odd address and even address of 8086 processor. 3.75
 (b) Write different memory models of 8086 processor with required number of code segment and data segment. 3
 (c) Determine the contents of the status flags after executing the instruction ADD AX, BX. Where AX contains FFFFH and BX contains FFFFH. 2
4. (a) Discuss the role of different segment registers and offset registers of 8086 microprocessor. 3
 (b) A memory location has physical address 80FB0H. In what segment does it have offset BFD2H? 2.75
 (c) Explain DOS and BIOS interrupts with example. 3

Section-B

5. (a) Define assembler directive. Mention some assembler directives with their tasks. 3
 (b) What is meant by range problem of conditional jump instructions? How can the problem be solved? 3
 (c) Mention the restrictions of MOV and XCHG instructions? Exchange the 15th and 30th elements in a word type array A. 2.75
6. (a) Explain signed overflow and unsigned overflow with example. 3
 (b) What is Program Segment Prefix? Explain. 2.75
 (c) Write some assembly codes that will reverse the bit pattern of AX register without changing its contents. 3
7. (a) Explain why TEST and JCXZ instructions are used. 2.75
 (b) What is masking? Set the most significant and least significant bits of DL register while preserving the other bits. 3
 (c) What is addressing mode? Discuss Indexed addressing modes with examples. 3
8. (a) What happened when CALL and RET instructions are executed? 2
 (b) How does CPU implement a conditional jump instruction? Explain with example. 2.75
 (c) Discuss the following string operations with assembly language instructions:
 (i) Scan a character from a string (ii) Compare a string with another string 4

Rajshahi University
Department of Computer Science and Engineering
B.Sc. Engineering Part-III, Even Semester Examination-2021
Course: CSE3241 (Operating System and System Programming)
Full Marks: 52.5, Time: 03 Hours

[Answer any 06 (six) questions taking at least 03 (Three) from each section]

Section-A

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|----|--|------|
| 1. | a) What is an operating system (OS)? Discuss the services of operating system. | 4 |
| | b) Differentiate among parallel, distributed and real time systems. | 3 |
| | c) Explain system calls. | 1.75 |
| 2. | a) 'A Process is an active entity, whereas a Program is a passive entity'- explain. | 2.25 |
| | b) What do you mean by 'CPU-bound process' and 'I/O-bound process'? In a multiprogramming environment, if all the processes are I/O-bound, then how does it affect the degree of multiprogramming? | 3 |
| | c) Illustrate the queuing diagram given below: | 2.50 |
| | | |
| | d) 'Rate of context-switching should be optimum'. Why? | 1 |
| 3. | a) What is cooperating process? What are the reasons for processes cooperation? | 3 |
| | b) Producer and Consumer are two cooperating processes working in a shared memory approach with bounded-buffer. Explain how item may be lost from the list of produced items due to concurrent access to the critical section. | 2.25 |
| | c) Define busy waiting? What is the main limitation of a busy-waiting solution to avoid race condition? | 2 |
| | d) What is the risk and threat of using TSL instruction or hardware lock to solve the critical section problem? | 1.5 |
| 4. | a) What are the criteria for CPU scheduling? Differentiate preempting and non-preemptive scheduling algorithms. | 2 |
| | b) How could you solve the starvation problem in case of priority scheduling technique? | 1.75 |
| | c) Consider the following set of processes, with the length of the CPU burst time given in milliseconds: | 5 |

The processes are assumed to have arrived in the order P1, P2, P3, P4, P5, all at time 0. A larger priority number implies a higher priority. Quantum=2 for Round-Robin algorithm.

Process	Burst Time	Priority
P1	2	2
P2	1	1
P3	8	4
P4	4	2
P5	5	3

- i) Draw four Gantt charts that illustrate the execution of these processes using the scheduling algorithms FCFS, SJF, non-preemptive priority and RR.
- ii) What is the average turnaround time for each of these scheduling algorithms?
- iii) What is the average waiting time for each of these scheduling algorithms?

Section-B

5. a) What are the necessary conditions to occur deadlock in a system? Discuss. 2
- b) 'A cycle in a resource allocation graph is a necessary condition to have deadlock in a system, but not sufficient.' Explain with appropriate examples. How could you prevent deadlock breaking the circular wait condition? 3
- c) We can handle deadlock in three possible ways. These are deadlock prevention, deadlock avoidance and recovery from deadlock. Which one is the best solution to deal with the problem of deadlock? Explain and justify your answer. 2.25
- d) If resource preemption is required to recover a system from deadlock, then what issues should be addressed? Discuss. 1.50
6. a) Define logical and physical addresses. Explain how a logical address is mapped into physical address. 3
- b) In paging memory management scheme, internal fragmentation problem can not be solved. Explain. 2
- c) On a typical Linux system, most user processes require the standard C library *libc*. One option is to have each process load its own copy of *libc* into its address space. If a system has 40 user processes, and the size of *libc* library is 2 MB, this would require 80 MB of memory. How can we satisfy this memory requirements of 40 users using only 2MB of memory in paging environment? Explain. 2.75
- d) Why are page sizes always powers of 2? 1
7. a) What is virtual memory? Discuss its advantages and disadvantages. 2.25
b) Define *dirty* or *modify* bit. Explain its uses and benefits while swapping out some pages from memory to backing store. 1.5
c) Explain why page replacement is needed. Compare the FIFO, Optimal and LRU page replacement algorithms with respect to the number of page fault occurs for the reference string given below: 4.5
- 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1
- d) What is the benefit of using page buffering technique? 1
8. a) What are the fundamental file operations an operating system performs? Discuss. 3
b) Every file type has its own internal structure, why? Discuss. 2
c) Explain how the problem of contiguous allocation method can be solved in linked allocation in case of storage allocation techniques. Explain with examples. 2.75
d) consider a disk where blocks 2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 17, 18, 25, 26, and 27 are free and the rest of the blocks are allocated. What would be the bit vector for the first 32 blocks? 1

Section-A

- | | |
|--|---|
| <p>1. (a) Suppose you are sending a series of text messages from your smartphone to your friend's phone using a mobile network. Explain the factors that the effectiveness of this communication system depends on.</p> <p>(b) Identify and explain the components of a complete data communication system.</p> <p>(c) A nonperiodic composite signal contains frequencies from 10 to 30 KHz. The peak amplitude is 10 V for the lowest frequency and 30 V for the highest frequency signal. Calculate the bandwidth and draw the frequency spectrum.</p> <p>2. (a) Draw the sine waves having the following properties for the duration of 2 seconds:
i) Frequency 2 Hz, Phase 90° and Amplitude 5 V, and ii) Frequency 4 Hz, Phase 180° and Amplitude 7 V.</p> <p>(b) A signal has passed through three cascaded amplifiers, each with a 4 dB gain. What is the total gain? How much is the signal amplified?</p> <p>(c) How many bits can fit on a link with a 2 ms delay if the bandwidth of the link is: i) 1 Mbps? ii) 10 Mbps?</p> <p>(d) How the latency of a link is measured? Find the propagation time and the transmission time for a 5-MB (megabyte) message (an image) if the bandwidth of the network is <u>1 Mbps</u>. Assume that the distance between the sender and the receiver is 12,000 km and that light travels at 2.4×10^8 m/s. <u>0.5 ms</u></p> <p>3. (a) What does self-synchronization mean in line coding? Which line coding techniques have self-synchronization?</p> <p>(b) Draw the digital signals encoded using NRZ-L and NRZ-I for the bit stream 11100010. Mention the problems that occurred for this bit combination with each technique. (Last non-zero signal level has been positive.)</p> <p>(c) What does QPSK mean? Explain the basic idea behind this QPSK.</p> <p>4. (a) Why addressing is necessary for statistical TDM?</p> <p>(b) How frames are synchronized in synchronous TDM? Explain.</p> <p>(c) Gigabit LANs use the multilevel line coding scheme to send 1-Gbps data over four copper cables that can handle 125 Mbaud each. What is the name of this technique? Explain the basic idea behind this technique.</p> | 3.5
3.25
2
1.5
3
2
2.25
2
3
3.75
2
2.75
4 |
|--|---|

Section-B

- | | |
|---|---|
| <p>5. (a) What does analog transmission mean? Why is analog-to-analog conversion required?</p> <p>(b) What is the number of bits per baud for the following techniques?
i) ASK with four different amplitudes;
ii) FSK with eight different frequencies;
iii) PSK with four different phases;
iv) QAM with a constellation of 128 points.</p> <p>(c) Find the bandwidth for the AM and FM ($\beta=5$) stations if we need to modulate a 5-KHz voice.</p> <p>6. (a) Why do we use multiplexing in analog and digital transmission?</p> <p>(b) Which multiplexing technique is used in digital transmission? What are the variations of this technique?</p> <p>(c) We have four sources, each creating 250 8-bit characters per second. If the interleaved unit is a character and 1 synchronizing bit is added to each frame, find (a) the data rate of each source, (b) the duration of each character in each source, (c) the frame rate, (d) the duration of each frame, (e) the number of bits in each frame, and (f) the data rate of the link</p> <p>7. (a) Define error detection and error correction. Why error correction is more difficult than error detection?</p> <p>(b) Given the dataword 10011 and the divisor 1011. Generate the CRC codeword at the sender side. Show how a single-bit error can be detected on the receiver side.</p> <p>(c) What is the purpose of cladding in an optical fiber? State some applications of optical fiber.</p> <p>8. (a) What is a period of a satellite? What are the categories of satellites based on the location of the orbit?</p> <p>(b) What do you know about the frequency bands for satellite communication?</p> <p>(c) What is an MEO satellite? Describe it with the example of GPS.</p> | 2.75
4
2
1.75
2
5
2
3
2
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3
2
3.75 |
|---|---|