

POKHARA UNIVERSITY

Level: Bachelor
 Programme: BE
 Course: Operating System (New)

Semester: Fall

Year : 2023
 Full Marks: 100
 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) What is operating system? Explain OS as resource manager and an extended machine. 8
- b) Producer Consumer problem can be solved with the help of various techniques. Suggest any one of the techniques to solve producer consumer with detailed explanation. 7
2. a) Given the following set of information, calculate the average waiting time and average turn-around time using FCFS, SJF, RR (Quantum = 2) and HRRN. 8

Process	Arrival Time	Service Time (Burst Time)
A	0	7
B	2	2
C	3	3
D	5	8

OR

Define threads. Explain the multithreading model in detail.

3. a) Define PCB. Explain the Readers and Writers problem with necessary pseudocode. 7
- b) Consider the following page reference strings: 2, 3, 4, 5, 3, 2, 6, 9, 3, 2, 3, 4, 8, 9, 4, 3, 2, 3, 4, 9. How many page faults would occur for each of the following page replacement algorithms assuming 3 pages a frame? In each case calculate fault ratio.
 - i. FIFO page replacement
 - ii. Optimal page replacement
 - iii. LRU page replacement

- b) Define Thrashing. Explain the concept of paging with a suitable example. 7

OR

What is difference between Paging and Segmentation? What are different page-table structures? Explain any one.

4. a) Why is deadlock state more critical than starvation? Describe resource allocation graph with a deadlock, with a cycle but no deadlock. 7
- b) What are different ways to input output? Explain the principles of I/O software. 8
5. a) What is file? With help of necessary diagram, explain file system allocation techniques. 8
- b) Explain the concept, characteristics and role of Distributed Operating System. 7
6. a) Define pre-paging. Explain WS page replacement algorithm with example. 8
- b) Explain about Memory wall and bottleneck problem for Operating System with necessary diagrams. 7
7. Write short notes on: (Any two) 2x5
 - a) Relocation and protection
 - b) RAID
 - c) Context switching

POKHARA UNIVERSITY

Level: Bachelor
Programme: BE
Course: Calculus II

Semester: Fall

Year : 2023
Full Marks: 100
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) Evaluate $\int_0^2 \int_0^{\sqrt{4-y^2}} \cos(x^2 + y^2) dx dy$ by changing into polar integration. 5
 - b) Evaluate: $\int_0^1 \int_0^1 \int_0^1 (x^2 + y^2 + z^2) dz dy dx$ 5
 - c) Find the volume in the first octant bounded by the coordinate planes, the cylinder $x^2 + y^2 = 4$ and $z + y = 3$. 5
 2. a) Solve the differential equation $y'' + (1 - x^2)y = 0$ by using power series method. 7
 - b) Define Legendre's equation. Also derive the solution of Legendre's equation. 8
- OR**
- If $J_n(x)$ represents the Bessel's function of order n then show that:
 - $\frac{d}{dx} [x^n J_n(x)] = x^n J_{n-1}(x)$. 5
 - $J_{\frac{1}{2}}(x) = \sqrt{\frac{2}{\pi x}} \sin x$, 5
3. a) State First Shifting Theorem of Laplace transforms. 8
 - Find the Laplace transform of $te^{-t} \cosh t$
 - Find the inverse Laplace transform of $\frac{1}{s^2 - 5s + 6}$
 - b) Solve the initial value problem:
 $y'' + 4y' + 3y = e^{-t}$, $y(0) = y'(0) = 1$ by using Laplace transform. 7
 4. a) If $\phi = \log(x^2 + y^2 + z^2)$ then find $\operatorname{div}(\operatorname{grad}\phi)$. 5

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✓ Find the directional derivative of $f = x^2yz + 4xz^2$ at $(1, -2, 1)$ in the direction $2\vec{i} - \vec{j} - 2\vec{k}$. 5

✓ Calculate: $\oint_C \vec{F} \cdot d\vec{r}$ if $\vec{F} = (y, z, x)$, C : $\vec{r} = (t, t^2, t^3)$, from $(0, 0, 0)$ and $(2, 4, 8)$. 5

5. a) Define Green's Theorem. Evaluate $\oint_c \vec{F} \cdot d\vec{r}$, where 8

$\vec{F} = (\sin y, \cos x)$ and c is the triangle with vertices $(0, 0), (\pi, 0), (\pi, 1)$, by using Green's theorem.

b) Evaluate $\oint_c \vec{F} \cdot d\vec{r}$ by using Stoke's theorem, where $\vec{F} = (y^2, z^2, x^2)$ 7
and c is the boundary of the surface S : $x + y + z = 1$ in the first octant.

OR

✓ Evaluate the surface integral $\iint_S \vec{F} \cdot \vec{n} dA$ where $\vec{F} = (x^2, y^2, z^2)$ and s : $\vec{r} = (u \cos v, u \sin v, 3v)$, $0 \leq u \leq 1$, $0 \leq v \leq 2\pi$. 5

6. a) Find the fourier series of $f(x) = x + |x|$ for $-\pi < x < \pi$. 7

b) Expand the function $f(x) = x^2$ in the interval $0 < x < \pi$ in half range Fourier cosine series and show that $\frac{\pi^2}{6} = 1 + \frac{1}{4} + \frac{1}{9} + \frac{1}{16} + \dots$ 8

7. Solve Any Two: 2x5

a) Find the general solution of $2u_x + 2u_y - u = 0$.

b) Derive the one-dimensional traffic flow model using conservation law.

c) Show that the value under integral sign $\int_{(4,0,3)}^{(-1,1,2)} [(yz + 1)dx + (xz + 1)dy + (xy + 1)dz]$ is exact and evaluate the integral. 5

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POKHARA UNIVERSITY

Level: Bachelor

Programme: BE

Course: Microprocessor and ALP (New)

Semester: Fall

Year : 2023

Full Marks: 100

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) Define microprocessor. Differentiate between Von Newmann and Harvard architecture along with its block diagram. 7
- b) Draw the functional block diagram of intel 8085 microprocessor and explain each block. 8
2. a) Draw and explain a well-labelled timing diagram of the instruction LXI B, D050H and calculate the time required to execute the instruction if frequency = 4Mhz. 8
- b) Write an ALP in 8085 to transfer 10 bytes of data of memory address starting from 5000H to 6000H .Comment in each line indicate full marks. 7
3. a) What are the major changes and advantages of 8086 over 8085 microprocessors? Explain addressing modes of 8086. 8

OR

- b) What are the types of FLAGS available in 8086 microprocessors? Show the Flag position and explain in brief with examples. 7
4. a) Write a 8086 program to find square root of a number. 7
- a) What are the assembler directives of 8086? List out some common directives that are used while programming. 7

OR

What are Macros? Explain DOS interrupt functions.

- b) Design an address decoding circuit to interface 2KB RAM, 4 KB ROM and 8 KB RAM with initial address 2000H. 8
5. a) Define parallel interface. Explain 8255 PPI. 7
- b) Draw and explain the architecture of 8251 USART along with its pins. 8
6. a) What is the difference between polled and Vectored interrupt handling technique? Explain with necessary diagram. 7
- b) What are the sources of interrupt? Explain interrupt vector Table. 8

7. Write short notes on: (Any two)

- a) Microcontroller and applications
- b) Synchronous and Asynchronous Bus
- ✓ 8259 PIC

POKHARA UNIVERSITY

Level: Bachelor

Semester: Fall

Year : 2023

Programme: BE

Full Marks: 100

Course: Database Management System (New)

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) What is data abstraction in DBMS? Explain in detail. 7
b) Consider you are asked to design a database for the Exam section of your college. Draw its ER diagram assuming required entities and their attributes. 8
2. a) Convert the ER diagram that you designed in question no 1 b) into relational schema. 7
b) What are the views? Consider the table **tbl_emp** as follows: 8

Emp_id	Emp_name	Salary	Department	Date_of_joining
101	Anish	20000	Packing	2070-02-01
102	Rojina	18000	Cleaning	2075-04-06
103	Sita	35000	Polishing	2078-09-12

Write the SQL statements for the following:

- i. Create the above table by considering Emp_id as primary key and insert the above records.
- ii. Change the Department of Anish to marketing.
- iii. Increase the salary of employees whose department is Cleaning by 12%.
- iv. Find the name of employees having salary greater than 16000 and who joined after 2072-11-25
- v. Add a new column Address to the above table.
- vi. Delete the entire table.

OR

Why is joining in SQL necessary? Explain Inner Join, Natural Join and Outer Join with suitable examples.

3. a) What are the different types of integrity constraints? Explain with examples. 8

4. a) What is denormalization? Why is it necessary? Explain in detail. 7
b) What is the role of views in security? Explain the concept of authorization with suitable examples. 7
5. a) Explain the basic steps in query processing in detail. 8
b) Explain how the records are organized using fixed-length and variable-length records. 7
6. a) What is serializability and why is it needed? Explain the ACID properties in brief. 8
b) What is crash recovery? Explain log-based recovery method with example. 7

OR

What is transaction rollback? Explain how the Remote Backup System provides high availability and recovery facility.

7. b) List out the different categories of NoSQL databases. Explain the concept of blockchain with its properties. 8
7. Write short notes on: (Any two) 2×5
 - a) Nested Queries
 - b) Third Normal Form (3NF)
 - c) Lock-based protocols for concurrency control

POKHARA UNIVERSITY

Level: Bachelor
Programme: BE
Course: Computer Graphics (new)

Semester: Fall

Year : 2023
Full Marks:100
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) What is Computer Graphics? Differentiate between raster and random display with its architecture. 8
- b) Why do we need hardware acceleration for graphics processing? Explain the significance of GPU in modern computer organization. Compare CPU with GPU. 7
2. a) What is scan conversion? How can equations be derived for drawing lines with slope greater than one using Bresenham's line drawing algorithm? Explain. 8
- b) What is composite transformation. Explain why do we need homogeneous coordinate system for transformation of computation in computer graphics. 7
3. a) How symmetric property of circle can be implemented to digitize circle having equation $(x-4)^2 + (y+5)^2 = 36$. Illustrate with necessary calculations using mid-point circle drawing algorithm. 8

OR

- ✓ What is window and viewport? Magnify the triangle with vertices A(0,0) B(1,1) and C(5,2) to thrice its size while keeping C(5,2) fixed. 7
- b) Explain the Sutherland Hodgeman polygon clipping algorithm considering the four different cases with example. 7
4. a) Let R be the rectangular window whose lower left hand corner is at L (-3, 1) and upper right-hand corner is at R (2, 6). Use Cohen – Sutherland algorithm to clip the line segments A (-4, 2) and B (-1, 7). 7
- a) How are Two Dimensional Rotations different from Three 7

Page 1 of 2

- Dimensional Rotations? Explain with the matrix representations.
- b) Derive the blending function for parametric cubic curve using Hermite interpolation technique. 8
 5. a) What are the drawbacks of Flat shading and Gouraud shading? How does normal vector interpolation scheme remove these drawbacks? 7
 - b) Explain painter's algorithm for visible surface detection with its necessary test cases. 8
 6. a) Define GKS and PHIGS. Mention different types of Graphics file format used in computer graphics. 8
 - b) How OpenGL APIs can be used to maintain graphical standards? Explain. 7
 7. Write short notes on: (Any two) 2×5
 - a) Color Models
 - b) 2D viewing pipeline
 - c) Frame Buffer

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POKHARA UNIVERSITY

Level: Bachelor
Programme: BE
Course: Data Communication (New)

Semester: Fall Year : 2023
Full Marks:100
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) Define Simplex, Half Duplex and Full Duplex mode of data transmission. Briefly explain digital communication system with the help of general block diagram. 8
- b) Differentiate between different types of transmission modes. Briefly Explain RS- 232C. 7
2. a) Define Signal. Briefly explain periodic and non-periodic signals, energy and power signals, deterministic and random signals, continuous and discrete time signals. 7
- b) Define unit step signal with necessary mathematical expression and graphical illustration. Check the following system for linearity, causality, static & dynamic and time invariance.

$$y(n) = Ax(n) + B$$
 8
3. a) Compare and contrast between OSI and TCP/IP with necessary figures. 7
- b) Define guided and unguided transmission media. State the advantages of optical fiber over other guided media. 8
4. a) Why burst error is difficult to handle than single error? Explain why CRC is better than parity method of error detection. 7

OR

- ✓ Explain various transmission impairments of a communication system. 8
- ✓ b) Compare and contrast between lossless and lossy compression. 8
5. a) Explain the importance of flow control. Briefly explain sliding window flow control mechanism. 8
- b) Explain the multiplexing technique applied in digital telephony with their significance, application and multiplexing hierarchy. 7
6. a) Is switching and routing same? Differentiate between message switching, circuit switching and packet switching. 8

- b) Differentiate between PSK, ASK and FSK modulation techniques with necessary diagram. 7

OR

- ✓ Encode the Bit Stream 011010001 using the following scheme.

- i. NRZ - I
- ii. NRZ _ L
- iii. Manchester
- iv. Differential Manchester

7. Write short notes on: (Any two)

- a) Cellular Telephony
- b) Point to Point protocol
- c) QPSK

2×5

National Academy of Science and Technology
 (Affiliated to Pokhara University)
 Dhangadhi, Kailali
Pre-University Examination
 Level: Bachelor Semester : III_Fall
 Program: B.E. (Computer/Civil) Course: Calculus II

Year: 2023
 F.M.: 100
 P. M.: 45
 Time : 3 Hrs.

Candidates are required to give their answer in their own words as far as practicable. The figures in the margin indicate full marks.
Attempt all the questions.

1. a) Evaluate $\int_0^{\pi} \int_x^{\pi} \frac{\sin y}{y} dy dx$ [7]

b) State Dirichlet's theorem. Use it to evaluate the triple integral $\iiint_V x^2 dx dy dz$. $\text{Ans: } 2\pi/3$ [8]

2. a) Using series solution method, solve: $(1-x^2)y'' - 2xy' + 2y = 0$.
 b) Express $x^3 + 2x^2 - x - 3$ in terms of Legendre polynomials.
 OR

Show that $\frac{d}{dx} [x^{-n} J_n(x)] = -x^{-n} J_{n+1}(x)$.

3. a) Evaluate:

i) $L \left\{ \frac{e^{-t} \sin at}{t} \right\}$ ii) $L^{-1} \left\{ \frac{1}{(s-1)(s^2+9)} \right\}$ [8]

b) Using Laplace transform, solve the initial value problem: $y'' - 2y' + y = e^t$, $y(0) = 2$, $y'(0) = -1$.

4. a) Show that the necessary and sufficient condition for the vector valued function \vec{a} of the scalar variable t to have a constant direction is $\vec{a} \times \frac{d\vec{a}}{dt} = \vec{0}$.

b) A particle moves along the curve $x = t^3 - 4t$, $y = t^2 + 4t$, $z = 8t^2 - 3t^3$, where t is the time. Find the component of its velocity and acceleration at time $t=1$ in the direction of $\hat{i} - 3\hat{j} + 2\hat{k}$.

5. a) State Green's theorem in the plane. Use it to evaluate the integral $\oint_C [(y - \sin x)dx + \cos x dy]$. [8]

6

[7]

b) Evaluate the surface integral $\iint_S (\vec{F} \cdot \hat{n}) ds$, where

$$\vec{F} = (x^2, -e^y, 1), S: x + y + z = 1; x \geq 0, y \geq 0, z \geq 0.$$

OR

Using Gauss Divergence theorem, Evaluate the surface integral

$$\iint_S (\vec{F} \cdot \hat{n}) ds, \text{ where } \vec{F} = (2xy + z, y^2, -x - 3), S: 2x + 2y + z = 6;$$

$$x = 0, y = 0, z = 0.$$

6. (a) Find the Fourier series of the function $f(x) = x^2, -\pi \leq x \leq \pi$. [8]

$$\text{Hence show that } \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots = \frac{\pi^2}{6}.$$

(b) Write the general form of one dimensional conservation law. Write any two applications of conservation law. Solve the p.d.e, $u_t + 2u \cdot u_x = 0$, $u(x,0) = e^{-x}$. [1+1+5=7]

7. Attempt Any four [2.5×4=10]

- i) Find the Laplace transform of $e^{-3t}u(t-2)$.
- ii) Find the unit normal vector to the surface $f = x^2y + 2xz - 4$ at $(2, -2, 3)$.
- iii) Show that the value under the integral sign of $\int_{(0,\pi)}^{(3,\frac{\pi}{2})} e^x (\cos y dx - \sin y dy)$ is exact. Hence evaluate it.
- iv) Check whether the function is odd or even. Find its period.

$$f(x) = \begin{cases} \frac{1}{2} + x & \text{for } -\frac{1}{2} < x < 0 \\ \frac{1}{2} - x & \text{for } 0 < x < \frac{1}{2} \end{cases}$$

v) Evaluate $\int_0^\pi \int_0^{\sin x} y dy dx$.

National Academy of Science and Technology
(Affiliated to Pokhara University)

el: Bachelor
rogram: B.E. Computer
Course: Database Management System

Dhangadhi, Kailali
Pre-University Examination

Semester: III- Fall

Year : 2023
F.M. : 100
P.M. : 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) Define database and DBMS. Explain the types of database Architecture? 7

b) Consider a bus ticketing system that records information about the passenger, bus and route. Passenger is assigned to a bus that travels to a route. A bus contains many passengers and a passenger can be assigned into only one bus. Many busses travel in same route but a bus can travel in only one route. The attributes of passenger are pid(unique), gender and phone_no(multi-values). Similarly bus contains regno(unique) and color and route contains rid(unique), distance and rate. 8

Make a complete ER diagram for this and explain all the cases given in question with the help of diagram.

2. a) Consider the following relational database.

Patient(PID, Pname, Paddress, Pgender, disease)
Doctor(DID, Dname, Daddress, Department, salary)
Appointment(PID, DID, time) 8

Write the SQL statement for the following.

1. List all the patients who were checked by doctors Pravin and Rubi.
2. List name and id of doctors whose salary is less than Rs. 120,000.
3. Delete doctor details whose salary is less than 25000.
4. Increase salary of all doctors by 10% who works in Forensic department.

- b) Consider the following relational database.

STUDENT(Ssn, Name, Major, DQB)
COURSE(Cnum, Cname, Dept)
ENROLL(Ssn, Cnum, Semester, Grade)
BOOK_ADOPTION(Cnum, Semester, ISBN)

TEXTBOOK(ISBN, Title, Publisher, Author) 8

- Write the relational algebra for the following.
- (1) List any department that has its adopted books published by publishing'.
 - (2) Find the names of students who have not been enrolled in any course.
 3. Delete the detail of student whose Major is 'DBMS'.
 4. List the course number taken by all students named 'John Smith' in winter 1999 (i.e., Semester = 'W99').
3. a) What is Normalization? Explain BCNF and 3NF with suitable example. 7
- b) Explain the different types of integrity constraints with examples. 7
4. (a) What is Access Control Mechanism (ACL) in database? Explain different types of access control. 8
- b) Discuss the steps involved in query processing with suitable diagram. 7
5. a) Define concurrency control. How do two phase locking and graph based protocol control concurrency? 7
- b) What is file organization? Explain file organization using hash based index and B+ tree index. 8
6. a) What is crash recovery? Explain the log based recovery techniques with example. 8
- b) What is distributed database? Explain the advantages of NoSQL over SQL. 7
7. Write Short notes on any two: 2×5
- a) Assertion and Triggers
 - b) Blockchain
 - c) ACID Properties

Pre-University Examination

Semester: III- Fall

Level: Bachelor

Program: B.E. Computer
Course: Microprocessor

Year : 2023

F.M. : 100

P.M. : 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) Suppose you need a processor for your project. Between microprocessor and microcontroller, what would you choose? How would you decide? 7
2. a) Why do you think implementation of flags are necessary in microprocessor? Explain it with the help of flags implemented in 8085. 8
2. b) An input port is sending a 8-bit datum every 1 sec for 10 seconds. Write a program in ALP for 8085 to store those data to a memory location 5051H. (Delay subroutine is not necessary) 8
3. b) Define T-state. Draw the labeled timing diagram of the instruction LHLD B. 7
3. a) How will you interface 4KB RAM and 2KB ROM with 8085? 8
4. a) Explain the architecture of 8259 PIC with labelled diagram. 8
4. b) Write a program to add two 32-bit numbers. 8
5. a) Explain the control word format of 8255 PPI. 7
5. b) Explain about IVT of 8086. 8
6. a) Define assembler directives. Explain the following assembler directives along with their format: The memory model definition, The PROC directive, The DB directive, OFFSET. 7
6. b) Write an ALP for 8086 to implement Pythagoras theorem. 8
7. a) Write a program in 8086 ALP to display "COMPUTER" in reverse order. 8
7. b) Write short notes on any two: 7
7. c) Memory mapped I/O vs I/O mapped I/O
Fetch, decode and execute
Pipelining in 8086 2x5

National Academy of Science and Technology

(Affiliated to Pokhara University)

Level: Bachelor
 Program: B.E. Computer
 Course: Operating System

Dhangadhi, Kailali
Pre-University Examination
 Semester: III_Fall

Year : 2023
 F.M : 100
 P.M : 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) Define Operating System. Explain with different types with example. 8
- b) Do you think a process can exist without any state? Justify your view with the help of process state transition diagram and PCB.
2. a) What is memory management? Explain memory hierarchy. 7
- b) Consider following set of processes along with their burst time, arrival time and priorities. Calculate average waiting time and average turnaround time using following scheduling algorithms.
 - v. FCFS → AT
 - vi. SJF → BT
 - vii. Priority (Preemptive)
 - viii. HRRN

Process	Arrival Time	Burst Time	Priority
A ✓	0	2 ✓	5 4 3 2 1
B ✓	2	6 ✓	4 3 2 1
C ✓	4	4 ✓	1
D ✓	6	5 ✓	3 2 1
E ✓	8	2 ✓	2 1
F ✓	3	4 ✓	1

Arrival time of define
 burst time & priority
 of each

3. a) Given five memory partitions of 100 KB, 500KB, 200KB, 300KB and 600KB (in order), how would the first-fit, best fit and worst-fit algorithms place processes of 212KB, 417KB, 112KB, and 426KB (in order)? Which algorithm makes the most efficient use of memory? Illustrate. 7

10
X 8

- b) Suppose a disk drive has 5500 cylinders, numbered 0 to 5499. The drive is currently serving a request at cylinder 2243 and the previous request was at cylinder 1125. The queue of pending requests in FIFO order is

586, 1470, 1913, 1774, 5348, 1509, 5022, 1750, 130

Starting from the current head position what is the total distance that the disk arm moves to satisfy all the pending requests for each of the following disk scheduling algorithms?

- v. FCFS
 - vi. Closest Cylinder Next//SSTF
 - vii. C-Scan (Initially moving upward)
 - viii. Scan (Initially moving downward)
4. a) What is the difference between absolute and relative path name of a file? What criteria should be used to decide which strategy? (Contiguous, linked, indexed, allocation) is best utilized for a particular file? 7
- b) List different classical IPC problems. Explain any one with algorithms. 8
5. a) Compare and contrast between virus and worm. Explain Access Control List (ACL) and Access Control Matrix (ACM). 7
- b) Define Deadlock. What are the conditions and methods of handling deadlock? Explain 8
6. a) Define RAID. Explain with different level with diagrams. 7
- b) Write the difference between logical and physical address. Describe about Coalescing and Compaction with suitable examples. 8
7. Write short notes on: (Any two) 2×5
- a) The Shell
 - b) Types of Kernels
 - c) Kernel vs User mode

National Academy of Science and Technology
(Affiliated to Pokhara University)
Dhangadhi, Kailali
Pre University Examination

Level: Bachelor
Programme: BE Computer
Course: Computer Graphics

Semester: Fall_III

Year : 2023
Full Marks: 100
Time : 3 hrs.
Pass Marks: 45

*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) Explain the need and use of graphics in the field of IT. 7
b) Explain architecture of Raster scan system with importance of video controller. 8
2. a) What is scan conversion? Derive Bresenham's line drawing algorithm for $|m|<1$. 8
b) Derive midpoint Ellipse algorithm of region 1. 7
3. a) Why do we need clipping? Explain Cohen-Sutherland Line Clipping algorithm. 8
b) What will be the final coordinates of a polygon with vertices A(3,4) B(5,4) C(5,2) D(3,2) after it is rotated about a 45 degree angle and fix point (2,3) ? 7
4. a) Differentiate between 2D and 3D graphics? In computer graphics which dimensional is more applicant? 8
b) Derive quadratic cubic bezier curve. and explain the Bezier curve properties. 7
5. a) Explain Gouraud and Phong shading methods with advantages and disadvantages. 8
b) What is ambient light and various light reflection? Derive illumination model. 7
6. a) Explain about GKS and different kinds of graphics file formats. 8
b) What are the drawing basic output primitives of OpenGL API? 7
7. Write short notes on following (Any Two) 5x2
 - a) Video controller
 - b) DDA
 - c) Visualization of Data set

National Academy of Science and Technology

(Affiliated to Pokhara University)

Dhangadhi, Kailali

Pre University Examination

Bachelor

Name: BE Computer
Course: Data Communication

Semester: Fall_III

Year : 2023

Full Marks: 100

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) What are standards? Explain its types. Also explain the standard organizations in data communication.
b) What do you mean by data compression technique? Explain the different types of compression techniques
2. a) Define Time Invariant System. Explain the following properties of the systems: a) causality b) linearity c) stability d) memory
b) Explain deterministic and random signal with example. Justify whether unit step signal is energy signal or power signal
3. a) Explain the existence of Fourier Transform. Find the Fourier Transform of Signum function.
b) Compare and Contrast Frame relay, X.25 and ATM.
4. a) Why optical fiber is considered advantageous over other copper media? Explain. Also, explain about different propagation techniques.
b) A bit stream is 10011101 is transmitted using the standard CRC method. The generator polynomial is x^3+1 . Derive the actual bit string transmitted. Show that the error is detected if any one bit in the received bit stream is inverted.
5. a) Define flow control as a layered protocol model. Explain the mechanism of a flow control for an ARQ model.
b) Compare and Contrast between Virtual Circuit Network and Datagram network.
6. a) Differentiate between encoding and modulation? Explain frequency modulation with an example.

- Q) Encode digital data 1100000101110001 using
(i) NRZ-L (ii) NRZ-I
(iii) AMI (iv) Manchester

7. Write short notes on: (Any two)

- a) Synchronous and asynchronous Communication
- b) Types of Switching
- c) TCP/IP VS OSI Model

2×5

8
7
8
4+3

National Academy of Science and Technology

Dhangadhi, Kailali

Level: Bachelor

First Terminal Examination

Year :2023

Program: B.E. Computer

Semester: III Fall

F.M. :100

Course: Computer Graphics

P.M.:45

Time: 3hrs.

Candidates are required to give their answer in their own words as far as practicable. The figures in the margin indicate full marks.

Attempt all questions.

1. a) Explain the application of computer graphics in the field of information technology. 7
b) Explain different types of touch panels with its working mechanism. 8
2. a) What is scan conversion? Derive Bresenham's line drawing algorithm for $|m| > 1$. 8
b) Digitize one octant of circle by using mid point circle generation algorithm center at (10,20) and radius is 10. 7
3. a) Derive Ellipse Drawing algorithm. 8
b) Explain Boundary fill algorithm. 7
4. a) Differentiate between raster and random scan system. 8
b) Write the DDA algorithm to find points between (x,y) to (x_k,y_k) . 7
5. a) Using Bresenham's line drawing algorithm predict the pixels on the line from (2,2) to (12,10). 8
b) Explain Flood Fill area filling algorithm. 7
6. a) Explain about the monochrome CRT.. 8
b) How the colors are displayed in Monitor? Explain all methods.. 7
7. Write short notes on following (Any Two) 5x2
 - a) Video controller
 - b) DDA
 - c) Scan Line Area Fill Algorithm

First Terminal Examination

Semester: III_Fall

Level: Bachelor

Program: B.E. Computer/Civil

Course: Calculus-II

Year :2023

F.M. :100

P.M.:45

Time: 3hrs.

*Candidates are required to give their answer in their own words as far as practicable. The figures in the margin indicate full marks.
Attempt all questions.*

1. a) Evaluate the integral $\int_0^2 \int_{y^2}^4 y \cos(x^2) dx dy$. [8]
 b) Find the volume in the first octant bounded by the co-ordinate planes, the cylinder $x^2 + y^2 = 9$ and the plane $z + y = 3$. [7]
2. a) Change the following integral into polar form and evaluate:

$$\int_{-1}^1 \int_0^{\sqrt{1-x^2}} \frac{2dydx}{(1+x^2+y^2)^2}$$

 b) Using power series method, solve $y''+xy=0$. [7]
3. a) Write Legendre's differential equation and solve it by power series method.
 b) If $J_n(x)$ is a Bessel's function, prove that
 i) $J_{-n}(x) = (-1)^n J_n(x)$ ii) $\frac{d}{dx}[x^n \cdot J_n(x)] = x^n \cdot J_{n-1}(x)$ [7]
4. a) Define Laplace transform. Find the Laplace transform of the following functions (Any Two):
 i) $t^2 \sin wt$ ii) $\frac{e^{-t} \cos t}{t}$ iii) $te^{-t} \cosh t$ [8]
 b) Find the inverse Laplace transform of the following functions:
 i) $\log\left(1 + \frac{w^2}{s^2}\right)$ ii) $\frac{1}{s(s^2+w^2)}$ [7]
5. a) Solve the initial value problem using Laplace Transform:
 $y'' + 2y' - 3y = 6e^{-2t}$, $y(0) = 2$, $y'(0) = -14$. [8]
 b) State and prove first shifting theorem of Laplace transform. Use it to evaluate the Laplace transform of $e^{-2t} \sin \pi t$. [7]

6. a) Define Fourier series of a function of period 2π . Find the Fourier series of

$$f(x) = \begin{cases} 1 & \text{for } -\pi < x < 0 \\ -1 & \text{for } 0 < x < \pi \end{cases}$$

b) Find the Fourier series of $f(x)$

$$f(x) = \begin{cases} k & \text{for } -\frac{\pi}{2} < x < \frac{\pi}{2} \\ 0 & \text{for } \frac{\pi}{2} < x < \frac{3\pi}{2} \end{cases}$$

and show that $k = \frac{1}{2\pi} \int_{-\pi}^{\pi} f(x) dx = \frac{1}{4\pi}$

7. Answer all

i) find the smallest period of the function given.

ii) Evaluate $\int_0^\infty \int_0^x (x-y)^2 e^{-y^2} dy dx$

iii) Draw the graph of the 2-symmetrical polynomials $P_1(x)$ and $P_2(x)$.

iv) Find the Laplace transform of unit step function.

(m=5, R=100)

(m=5, R=100)

6. a) Define Fourier series of a function of period 2π . Find the Fourier series of [8]

$$f(x) = \begin{cases} 1 & \text{for } -\pi < x < 0 \\ -1 & \text{for } 0 < x < \pi \end{cases}$$

b) Find the Fourier series of [7]

$$f(x) = \begin{cases} k & \text{for } -\frac{\pi}{2} < x < \frac{\pi}{2} \\ 0 & \text{for } \frac{\pi}{2} < x < \frac{3\pi}{2} \end{cases}$$

and show that $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \dots = \frac{\pi}{4}$

7. Attempt all

[$4 \times 2.5 = 10$]

- i) Find the smallest period of the function $\sin \pi x$.
- ii) Evaluate: $\int_0^2 \int_0^4 (4 - x^2) dx dy$.
- iii) Draw the graph of the Legendre polynomials $P_2(x)$ and $P_3(x)$.
- iv) Find the Laplace transform of unit step function.

National Academy of Science and Technology

Dhangadhi, Kailali

First Terminal Examination

Level: Bachelor

Semester: III_Fall

Year :2023

Program: B.E. Computer

F.M. :100

Course: **Operating System**

P.M.:45

Time: 3hrs.

Candidates are required to give their answer in their own words as far as practicable. The figures in the margin indicate full marks.

Attempt all questions.

- 1 a) Define Operating System. Explain some of the function of operating system in brief. (7)
b) Explain the different structure of Operating System with diagram. (8)
- 2 a) Define process. Explain in details the process states and its transition diagram. (8)
b) Why multi-threading? Explain in brief about types of multi-threaded model. (7)
- 3 a) Define IPC. Explain the two fundamental ways of IPC with diagram. (7)
b) Define Race Condition. Also explain the different techniques to avoid race condition. (8)
- 4 a) What is a semaphore? Explain different types of semaphore with algorithms. (7)
b) Explain the producer consumer problem. Write down algorithm for producer consumer problem. (8)
- 5 a) Define Context Switching. Explain with diagram. (5)
b) Consider following set of processes along with their burst time, arrival time and priorities. Calculate average waiting time and average turnaround time using following scheduling algorithms. (10)
 - i. FCFS
 - ii. SJF
 - iii. Priority (Preemptive)
 - iv. HRRN

Process	Arrival Time	Burst Time	Priority
A	0	3	5
B	2	6	4
C	4	4	1
D	6	5	3
E	8	2	2
F	3	4	1

- 6 a) Define the need of PCB. Differentiate between Process and Threads in details. (8)
- b) Define Process Scheduling. Write Scheduling Criteria. Also Explain the need of process scheduling algorithm optimization criteria (7)

7. Write down short notes (on any two) **2x5 = (10)**
- a) File and Its Structure
 - b) Kernel
 - c) System Call

National Academy of Science and Technology

(Affiliated to Pokhara University)

Dhangadhi, Kailali

First Terminal Examination

Level: Bachelor

Semester : III _ Fall

Year: 2023

F.M.: 100

P. M.: 45

Time : 3 Hrs.

Program: B.E. Computer

Course: Microprocessor

Candidates are required to give their answer in their own words as far as practicable. The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Differentiate between microprocessor and microcontroller. 7
b) Differentiate between Harvard Architecture and Von-Neumann Architecture. 8
2. a) Draw the functional architecture of 8085 microprocessor and explain in brief. 8
b) Write a program to copy 10 bytes data from memory location starting from 5000H to memory location starting from 6000H. 7
3. a) Draw and explain timing diagram of ADD M. 8
b) Interface two 4 KB RAM with 8085 microprocessor. 7
4. a) Explain the instruction set of 8085. 8
b) Write an ALP for 8085 to count the integers available in an array starting from memory location 3500H to 3510H for exactly divisible by two and save the result in the register B. 7
5. a) Explain the addressing modes in 8085. 7
b) Explain the following instructions: LDA, SHLD, CMP, RAR 8
6. a) Explain the flag implementation in 8085. 8
b) Interface 8KB and 4KB RAM without foldback address with 8085. 7
7. Write short notes on any two: 2×5
a) Flags in 8085
b) Evolution of microprocessor
c) Timing diagram for I/O Read

National Academy of Science and Technology

(Affiliated to Pokhara University)

Dhangadhi, Kailali

First Terminal Examination

Level: Bachelor

Semester : III _ Fall

Year: 2023

Program: B.E. Computer

F.M.: 100

Course: Database Management System

P. M.: 45

Time : 3 Hrs.

Candidates are required to give their answer in their own words as far as practicable. The figures in the margin indicate full marks.
Attempt all the questions.

1. a) Define DBMS. Explain its importance and applications. 7
b) Define E-R diagram. Explain components of ER diagram with suitable example. 8
2. (a) Differentiate between inner join and outer join with examples. 7
(b) Consider the following relational database. 8
book(id, title, author, publisher, year, price)
bookstore(name, address, city)
sold(name, id, quantity)
Write the relational algebra statements for the following queries.
 1. Give the details of book whose author name starts from 'P'.
 2. Display book title and price whose sold quantity is more than 100.
 3. Delete book record whose price is less than 350.
 4. Insert a new book details.
3. a) What is relational Database Design? Describe the feature of good relational design. 7
(b) Compute the closure of functional dependencies $AB \rightarrow C$, $C \rightarrow D$, $D \rightarrow A$ for the relation $R = (A, B, C, D)$. Also list prime and non-prime attributes. 8

$AB \rightarrow C$

- .4. a) What is the importance of Normalization? Differentiate between 3NF and BCNF. 7
- b) What is a key in database? Explain the types of keys with example. 8
5. a) What is data abstraction? Explain its three levels with diagram. 7
- b) What is functional dependency? Explain the types of functional dependency. 8
6. a) Why do we need integrity constraints in database? Explain its types. 8
- b) Explain the types of database application architecture with suitable diagram. 7
7. Write short notes on:(Any Two) 2 x 5
- a) Schema and Instances
 - b) Armstrong's Axioms
 - c) DDL, DML and DCL

National Academy of Science and Technology

(Affiliated to Pokhara University)
Dhangadhi, Kailali

First Terminal Examination

Semester : III _ Fall

Level: Bachelor

Year: 2023

Program: B.E. Computer

F.M.: 100

Course: Data Communication

P. M.: 45

Time : 3 Hrs.

Candidates are required to give their answer in their own words as far as practicable. The figures in the margin indicate full marks.

Attempt all the questions.

- 1.a) What is data communication system? Explain the block diagram of data communication. [8]
- 1.b) "Data communication is more concerned with Baud rate than Bit rate". Justify this statement with example. [7]
2. a) What is Network Topology? Explain functions of OSI layers? [8]
b) Differentiate between LAN, WAN and MAN. [7]
- 3.a) Compare and contrast between twisted-pair, co-axial cable and optical fibre [8]
b) Check the periodicity of the given signal. $Y(t) = X^2(t)$ [7]
- 4.a) What does topology refers to? Explain about star, bus, and mesh Topology with an application of each. [8]
b) Define Signal. Explain Different types of Elementary signals with its discrete and continuous time representation [7]
5. a) What is system? Explain different properties of System. [8]
b) How collision can be detected and corrected in data transmission?
Explain in Brief about CSMA/CD. [7]
6. a) Differentiate between Frame relay and ATM. [7]
b) What are energy and Power signals. Determine whether the signal $X(t)=10[U(t+5)-U(t-5)]$ is a power or an energy signal. [8]
7. Write short notes (Any two) [5x2=10]
a) Shannon's Theorem
b) X.25
c) Impairments in Data Communication