

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 the given integral: $\int_0^{\pi} \int_x^{\pi} \left(\frac{\sin y}{y} \right) dx dy$. 5×3=15

b. Evaluate the integral: $\iiint_V x^2 yz dx dy dz$ throughout the volume bounded by the plane $x=0$,
 $y=0$, $z=0$ and $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$

c. Find the volume of the solid whose base is the region in xy- plane that is bounded by the parabola $y = 3-x^2$, $y=2x$ while top is bounded by the plane $z = x+1$.

2. a. Solve by using power series: $(1-x^2)y'' - 2xy' + 2y = 0$. 7.

b. (i) State the Rodrigue formula. Sketch the graph of $P_1(X)$ and $P_2(x)$ with its formulas.

(ii) Show that: $J_{\frac{1}{2}}(x) = \sqrt{\frac{2}{\pi x}} \cos x$. 4+4

OR

Find the solution of Bessel's Equation.

8

$$x^2 y'' + xy' + (x^2 - \nu^2)y = 0$$

3. a. (i) Find the Laplace Transform of $t \cos at$ and $\frac{\sin t}{t}$

(ii) Find the inverse Laplace transform of the function $\frac{s+1}{s^2(s+3)}$. 2+2+4.

b. Solve the given initial value problem using the Laplace transform $y'''' + 2y'' - y' - 2y = 0$
 $y(0) = y'(0) = 0$ & $y''(0) = 6$. 7

4. a. Prove that the necessary and sufficient condition for a vector function $\vec{r} = \vec{r}(t)$ to have constant direction is $\vec{r} \times \frac{d\vec{r}}{dt} = 0$

b. If $\phi = \ln(x^2 + y^2 + z^2)$ then find grad ϕ and Curl (grad ϕ).

c. If $\vec{f} = 2x\vec{i} + 4y\vec{j} + 8z\vec{k}$, Show that \vec{f} is irrotational and the scalar potential function ϕ so that $\vec{f} = \text{grad } \phi$. 5×3=15

POKHARA UNIVERSITY
SCHOOL OF ENGINEERING

Level: Bachelor
Programme: BoCE III
Course: Operating Systems

Semester –Fall

Year : 2024
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 OS. Discuss the different functions of operating system. 7
b) How CPU switches from one process to another? Illustrate with a diagram. What is switching overhead? 8

OR

Explain Dining Philosopher Problem in process synchronization and give solutions to it.

2. a) Consider the following set of processes, with the arrival times and the CPU-burst times given in milliseconds. Calculate the average waiting time and average TAT using SRTN, FCFS and RR(quantum=3ms). 8

Process	Arrival Time	Burst Time
A	1	5 32
B	3	3
C	4	3
D	2	1 0

- b) Define process. Explain PCB, process states and its transition with figures 7
3. a) Define page fault. Consider the following page reference strings: 1,3, 8,4,5,3,1,6,7. 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. 8

- i. Second Chance page replacement algorithm
- ii. LRU page replacement algorithm
- iii. Optimal page replacement algorithm

7

b) Define Relocation and Protection. With suitable diagram explain Inverted Page Table.

OR

Mention the differences between Paging and Segmentation. What are different page-table structures? Explain any one.

4. a) What is Internal and External Fragmentation. Explain TLB in detail.

7

b) Considering a system with five processes P₀ through P₄ and three resources of type A, B, C. Resource type A has 10 instances, B has 5 instances and type C has 7 instances. Suppose at time t₀ following snapshot of the system has been taken:

8

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P ₀	0	1	0	7	5	3	3	3	2
P ₁	2	0	0	3	2	2			
P ₂	3	0	2	9	0	2			
P ₃	2	1	1	2	2	2			
P ₄	0	0	2	4	3	3			

- i. What will be the content of need matrix?
- ii. Is the system in a safe state? If Yes, then what is the safe sequence?

5. a) What do you understand by design principles in OS? Explain different Input output techniques with diagrams

8

b) Why we need to organize the file? Explain the ways of file organization with suitable diagrams.

7

6. a) Portray the characteristics of Cloud Operating System as well as mention the different security issues in OS.

8

b) Define Memory Wall and explain its impacts in OS.

7

7. Write short notes on **any two**:

- a) Kernel and its Types
- b) Memory hierarchy
- c) Bottleneck in OS

Exam	Final Internal Examination 2081		
Level	B.E.	F M	100
Programme	Computer	PM	45
Semester	III	Time	3 hrs

Subject: Microprocessor and ALP

Candidates are required to give answers in their own words as far as practicable.
The figure in the margin indicates full marks.
Attempt all the questions

- 1
 - a. Differentiate microprocessor and microcontroller. Explain instruction cycle in detail. 7
 - b. Explain block diagram of 8085 microprocessor in detail. 8
- 2
 - a. Describe data transfer group of instructions in 8085. 8
 - b. Draw a labelled timing diagram for the instruction LDA. 7
- 3
 - a. Write an assembly program for 8085 to find the square of the given numbers from memory location 6000 H and store the result in memory location 7000 H. 7
 - b. Explain programmable interrupt controller (8259) in detail. 8
- 4
 - a. Draw a circuit for 8085 to interface 4K X 8 ROM and 1K X 8 RAM. 8
 - b. Write an 8086 ALP to display the string "UNIVERSITY" in reverse order. 7
- 5
 - a. What are different pre-defined interrupts in 8086 microprocessor? Explain with the use of Interrupt Vector Table. 8
 - b. What is macro assembler? Differentiate Macros and Procedure.

OR

Write 8085 program to perform 8-bit multiplication with starting address 2000 H. 7
- 6
 - a. Explain DMA in detail. 8
 - b. Explain bus structure of microprocessor. What do you mean by synchronous and asynchronous bus?

OR

Explain 8086 microprocessor with block diagram. 7
- 7 Write short note on: (any two) (5+5)
 - a. Memory mapped IO and IO mapped IO
 - b. Serial and parallel data communication.
 - c. Addressing Modes in 8085

-- Best of luck --

Data Communication, Magh 29th - Fall 2024
Total marks: 100, Pass marks: 45
BoCE III semester

Attempt all the questions.

1. a) Draw a generic block diagram of digital communication system and briefly explain the function for each block. (4+4)
b) Differentiate between parallel and serial transmission. Briefly explain RS232C interface standards. (7)
2. a) Explain deterministic and random signal with example. Justify whether unit step signal is energy signal or power signal. [4+3]
b) Define linear, stable, time invariant and causal system with examples. (8)
3. a) What is PDU? Differentiate between LLC and MAC sub layer of datalink layer of OSI reference model. (2+6)
b) What is meant by "Open System Interconnection"? Briefly explain the layers of OSI reference model. (7)

OR

Briefly explain the protocols and services offered by TCP/IP layers.

4. a) What do you mean by guided media? Mention the advantages of optical fiber over co-axial cables and twisted pair cables. (2+6)
b) Describe the transmission impairments for communication system with suitable example. (7)
5. a) Define flow control. Briefly explain stop and wait, go-back-N, selective-repeat request ARQ. (2+5)
b) Compare and contrast between circuit switching, packet switching and message switching. (8)

OR

What do you mean by multiplexing? Explain FDM hierarchy in telephone system.

6. a) Differentiate between AM and FM. Why is FM superior over AM in communication? (4+4)
b) What are the benefits of modulation? Explain ASK, FSK and PSK with mathematical expression and necessary diagram. (8)
7. Write short notes on (Any Two): (2X5)
 - i) HDLC protocol
 - ii) Lossy Compression
 - iii) Bit Rate / Baud Rate

POKHARA UNIVERSITY FACULTY OF SCIENCE AND TECHNOLOGY SCHOOL OF ENGINEERING	Exam	Final Internal Examination 2025		
	Level	B.E	F M	100
	Programme	BCE	PM	45
	Year/Part		Time	3 Hrs
Subject: Computer Graphics				

Candidates are required to give answers in their own words as far as practicable.
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Attempt all the questions

1.	a) Explain application areas of computer graphics.	7
	b) Rasterize the line from (0,0) to (6,7) using bresenham line drawing algorithm.	8
2.	a) Explain flood fill techniques with its algorithm.	8
	b) Derive a transformation matrix due to perspective projection.	7
3.	a) Perform a 45 degree rotation of triangle A(0,0),B(1,1),C(5,2) about fixed point (-1,-1).	7
	b) Obtain a window to viewport transformation matrix explaining each steps.	8
4.	a) Describe the rotation of an object about an axis , which is not parallel to any of three coordinate axes of coordinate system.	9
	b) Explain scan line method for visible surface determination with suitable example.	6
5.	a) Develop an illumination model for a point source considering the effect of ambient light, diffused and specular reflection.	7
	b) Why machine independent programming language is used? Discuss any 5 file formats.	8
6.	a) Define Aspect ratio and bit depth. How computer graphics is different from image processing?	5
	b) Explain beam penetration and shadow mask method for color generation.	5
	c) Explain about different techniques for 3D object representation.	5
7.	Write short notes on (Any Two)	5
	a. Back face surface detection method	x
	b. CMYK color model	2
	c. Line clipping in 2D	

-- Best of luck --

Pokhara University
School of Engineering

Level: Bachelor

Semester – Fall

Year: 2024

Program: BE Computer Engineering

Full Marks: 100

Course: Database Management System (new)

Time: 3 hrs.

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

Attempt all the questions.

1. a) What do you mean by data independence? How is schema different from instance? Justify with suitable examples. 7
- b) What do you understand by E-R model? Draw an E-R diagram for a Online Book Store including primary key, weak entity, composite attribute, derived attribute and multivalued attributes in your ER diagram. 8
2. a) What is a view? Give one example of it. Write importance of data dictionary. 7
- b) Given relation schema as below 8
Employee (emp-id, name, address, telephone, post, salary, age)
Works_on (emp-id, dept-id, join-date)
Department (dept-id, dept-name, phone, budget)
Write the sql commands for the following.
 - i. Insert new record in Department relation.
 - ii. Find the name of the department on which salary of employee is greater than or equal to 20000.
 - iii. List the name of employees whose name starts with "A" and ends with "h"
 - iv. Find the employee name and department name of those employees who living in address Pokhara.
 - v. Increment the salary of the employee by 25% whose post is manager.
 - vi. List name of employee whose age is greater than average age of all employees.
 - vii. List employee id of all employees who joint project on "06/05/2020"
 - viii. List the name of employees whose name starts with N or with K
3. a) Define normalization. Explain about 1NF, 2NF, 3NF and BCNF with suitable examples. 8
- b) What are the roles of Assertions and Triggers in SQL? Explain with examples. 7
- OR
Explain stored procedure with an example.
4. a) Explain cryptography and its types with related diagram of each. 8
- OR
What is NoSQL? What are the types of NoSQL databases? Explain with example.
- b) What is Query optimization? How can it be achieved? 7
5. a) Suppose we are given the following table definitions with the certain records in each table. 8
PROJ (PNO, PNAME, BUDGET)
EMP(ENO, ENAME, TITLE)
ASG(ENO, PNO, DUR)
Write the RA expression for following tasks:
 - i) "Find the names of employees other than Hari Karki who worked on ABC ERP project for either 2 or 3 years".

ii) Construct **initial operator tree** and **final efficient operator tree** by following the steps in query optimization.

b) Explain insertion in B+ Tree index file with related example.

7

6. a) Explain conflict and view serializability. Test conflict serializability of the following schedule

8

T1	T2	T3
Read(X)		
	Read (Z)	
		Read (X)
Read (Z)		
	Read (Y)	
		Read (Y)
Write (X)		
	Write (Z)	
		Write (Y)
	Write (Y)	

b) What are the various types of failures that can occur in database? Discuss the log based recovery mechanism.

7

7 Write short notes on (any two)

2x5

a) Denormalization

b) Blockchain

c) Shadow Paging