POKHARA UNIVERSITY
FACULTY OF SCINCE AND TECHNOLOGY

SCHOOL OF ENGINEERING

Exam	Final Internal Examination 2024		
Level	B.E.	F M	100
Program	Computer	PM	45
Year/ Part	II/II	Time	3 Hrs

Subject: Theory of Computation (new course)

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

1.	a)	What are the different proof techniques? Explain pigeon hole principle with an example.	7
	b)	Define DFA. Design a DFA that accepts a set of strings having even number of a's and even number of b's over the alphabet {a,b}.	8
2.	a)	State the pumping lemma for regular set. Show that $L = \{0^i 1^i \mid i>0\}$ is not regular.	8
	b)	Define regular expression. Construct a finite automata equivalent to the following regular expression. $(a(a+b)b^* + bb(a)^*$.	7
3.	a)	Define Context Free Grammar. Check whether the given grammar $S \rightarrow aB \mid ab$, $A \rightarrow aAB \mid a$, $B \rightarrow AB \mid b$ is ambiguous or not.	7
		OR	
	b)	Design a CFG to for the language $a^n ba^{n+1} \mid n>=0$.	8
		Convert the following CFG into Chomsky Normal Form. $S \rightarrow Sbb \mid aabb \mid Aa \mid Bb$ $A \rightarrow Aa \mid a$ $B \rightarrow Bb \mid b \mid \varepsilon$	
		OR	
		Convert the following CFG into Chomsky Normal Form. $S \rightarrow PoKhArA$.	
4.	a)	Design a PDA for the language $L=\{a^n b^{2n}$, where $n>=1\}$.	7
	b)	"TM is stronger than PDA and FA". Explain this statement with their suitable block diagram.	8
5.	a)	Define Turing Machine. Design a Turing Machine which compute the function $f(m) = m+1$ for each m that belongs to set of natural numbers.	8
	b)	Convert the following CFG to equivalent PDA. $S \rightarrow AS \mid A$, $A \rightarrow 0A \mid 1B \mid 1$, $B \rightarrow 0B \mid 0$	7
6.	a)	Write about Church Turing thesis and universal Turing machine.	5
	b)	Differentiate between Recursive and Recursively enumerable languages.	5
	c)	Define computational complexity theory. Define class P and class NP.	5
7.	**Write short notes on:** *(Any two)*		2×5
	a)	Halting problem	
	b)	Decision properties of regular sets	
	c)	Chomsky's hierarchy	

**** Best of Luck ****

Pokhara University

Internal Examination

Level: Bachelor

Year 2024

Program: BE Computer IV

Full Marks:100

Pass Marks:45

Subject: Research Methodology

Candidate 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 the Term "Research." Why Are Objectives of a Research Proposal Significant?	7
1 b	What Are Various Types of Research Design? Differentiate Between Qualitative vs Quantitative Research.	8
2 a	What are 6Ps why researcher always focusses on them? Explain?	8
2 b	Why is Literature Review Significant in Research? Explain Various Styles of Conducting Literature Review in Modern Research.	7
3 a	Why Are Research Questions Needed in Research? Explanation its Various Styles in Academic Writing.	7
3 b	What Are Citations? Prepare a bibliography of following using APA, Vancouver and MLA Author: John Smith Title of Article: A Comparative Study of Modern and Traditional Technology of Web Surfing Using Artificial Technology Journal Name: Engineering Technology Journal Volume: 5th December Publisher: School of Stanford DOI: http://234554353 Pages: 33-56	8
4 a	What is Plagiarism? How Can You Ensure Your Writing is Free from It? Explain you key points.	7
4 b	How is the Concept of Triangulation Useful in a Research Project? Explanation its Advantage in Academic Research.	8
5 a	What is Research Ethics? List Responsibilities of an Ethical Researcher.	7
5 b	What Are the Various Components of a Research Proposal? List Them Out in.	8
6 a	How Research Data will be Generated in Research? Explain Its Techniques and Instruments for Data Collections.	7
6 b	Differentiate Between Case Study and Action Research Design.	8
7	Any two short note	15
a	Questionnaire Survey	5
b	Ethnography study	5

discipline

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Computer Architecture, Spring 2024
Total marks: 100, Pass marks: 45
BoCE IV semester

Attempt all the questions.

1. a) What are the advantages of the Harvard architecture in relation to the Von Neumann architecture? Explain. (7)
b) Explain the terms. (4x2)
i) addressing modes ii) instruction set architecture iii) instruction cycle iv) micro-operation

2. a) What is CPU organization? Describe Register Organization in details (7)
b) What is Booth's Algorithm in Computer Architecture? Explain (8)

3. a) What is Cache Mapping? Explain Cache Replacement Algorithm with a suitable example. (2+5)

OR

Explain various storage devices of memory hierarchy. (7)

b) What is the difference between hardwired control unit and a micro programmed control unit? Explain the relative difference of each. (8)

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architecture? Explain. (7)

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Explain various storage devices of memory hierarchy. (7)

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4. a) DMA is a hardware-based transfer. Justify (7)

b) Why I/O module is necessary? Explain the communication process between CPU and I/O channel. (8)

5. a) What is register transfer language? Compare and contrast between arithmetic and logical micro-operation. (2+5)

b) How can we improve performance on hardware and software while designing a processor? Explain. (8)

OR

What is power efficient processor? Explain dual core processor with respect to quad core processor. (8)

6. a) Explain instruction pipelining with suitable example. (7)

b) Discuss about RISC pipeline with example. (8)

7. Write short notes on (Any Two): (2X5)

i) GPU and TPU

ii) Floating point representation

iii) Cache Write Poly

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Level	B.E.	F M	100
Program	Computer	PM	45
Year/ Part	III/I	Time	3 Hrs

Subject: Theory of Computation

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

1.	a)	Define DFA. Design a DFA that accepts a set of string such that every string ends in 010 over alphabet {0,1}.	7
	b)	Define regular expression. Construct a finite automata equivalent to the following regular expression. (a + a (b+aa) * b)* a (b + aa)* a	8
2.	a)	a) State the pumping lemma for regular set. Show that L = {0^i1^i i>0 } is not regular.	8
	b)	Convert the following CFG into Chomsky Normal Form. S →Sbb|aabb|Aa|Bb A →Aa|a B →Bb|b|ε	7
3.	a)	Define Context Free Grammar. Check whether the given grammar S→aB|ab, A→aAB | a, B→AB|b is ambiguous or not.	7
	b)	Design a PDA for the language L={$a^mb^nc^{m+n}$, where m & n>=1}.	8
4.	a)	"TM is stronger than PDA and FA". Explain this statement with their suitable block diagram.	7
	b)	State the pumping lemma for context free language. Prove that L={a^n , n is prime number is not context free language}.	8
5.	a)	Explain the possible extensions of basic model of Turing Machine.	8
	b)	Convert the following CFG to equivalent PDA. S→0S1 |00 | 11	7
6.	a)	Write about Church Turing thesis and universal Turing machine.	5
	b)	Differentiate between Recursive and Recursively enumerable languages.	5
	c)	Define computational complexity theory. Define class P and class NP	5
7.	**Write short notes on:** *(Any two)* a) Halting problem b) Properties of regular language c) Tractable and Intractable Problems		2×5

**** Best of Luck ****

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Exam	Final Internal Examination 2024		
Level	B.E.	FM	100
Program	Computer	PM	45
Year/ Part	II/II	Time	3 Hrs

Subject: Advance Programming with Java

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

1.a) Explain the Java architecture and the significance of class paths in Java. 7

1.b) Explain the concept of exception handling in Java. Write an example program. 8

2.a) Describe the purpose of interfaces in Java and how they differ from abstract classes. 8

2.b) Differentiate between upcasting and downcasting in Java. Provide examples to illustrate each. 7

3.a) Explain layout management in Java Swing. Write a program to demonstrate a login form with username and password field with a sign in button. 8

OR

Explain VBox or HBox in Java. Write a program to demonstrate the user registration form with a submit button.

3.b) Compare JavaFX and Swing. Discuss the strengths and weaknesses of each. 7

4.a) Explain the concepts of TCP, UDP, IP Address, and Ports in the context of network programming.

4.b) Explain the architecture of RMI (Remote Method Invocation)

OR

Explain the architecture of CORBA (Cross Origin Request Broker)

5.a) Explain the concepts of IDL (Interface Definition Language) and provide a simple CORBA program example.

5.b) Differentiate between JDBC driver types and discuss their configurations

6.a) Discuss HTTP methods and responses in web applications.

b) Explain the life cycle of web servlets.

7. Write Short Notes on:
   (a) Object-Relational Mapping (ORM)
   (b) Multithreading in Java
   (c) Singleton Pattern
   (d) SQL Injection

POKHARA UNIVERSITY
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Exam	**Final Internal Examination 2081**		
Level	Bachelor	F M	100
Programme	BEEE	PM	45
Year/Part	IV	Time	3 hrs

Subject: Numerical Methods

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) Find a root of an equation $x^2 - 3 = 0$ using Bisection method, correct up-to 3 decimal places. *(7)*

b) What are the limitations of NR method? Using NR method, find the root of equation $x^3 - x - 1 = 0$ correct up-to 4 decimal places. *(8)*

2 a) Find solution when x=302 using Newton's Divided Difference Interpolation formula *(8)*

x	f(x)
300	2.4771
304	2.4829
305	2.4843
307	2.4871

b) Fit a least square line for the following data *(7)*

XX	1	2	3	4	5
YY	2	5	3	8	7

3 a) Show mathematical difference between trapezoidal rule and Simpson's 1/3 rule. Find solution using Trapezoidal rule and Simpson 1/3 rule *(4+4)*

x	1.4	1.6	1.8	2	2.2
y	4.0552	4.953	6.0436	7.3891	9.025

b) $F(x) = 0.2 + 25x - 200x^2 + 675x^3 - 900x^4 + 400x^5$, find $\int_a^b f(x)\,dx$, a = 0, b = 0.8 by Romberg's Integration. *(7)*

4 a) Find largest eigenvalue and corresponding eigenvector using power method for the matrix A if *(7)*

$$A = \begin{bmatrix} 2 & -3 & 0 \\ 2 & -5 & 0 \\ 0 & 0 & 3 \end{bmatrix}$$

-- Best of luck --

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b) Solve the following equations using Cholesky's Method (8)

$$10x + y + z = 12$$
$$x + 10y - z = 10$$
$$x - 2y + 10z = 9$$

5 a) Find y (0.2) for $y' = (x-y)/2$, y (0) = 1, with step length 0.1 using Runge -Kutta 4th order. (7)

b) Solve using shooting method:

$$y'' + xy' - xy = 2x$$

with boundary conditions y(0) = 1, y(2) = 8. (8)

7

6 a) When u (0, t) = 0, u (4, t) = 0 and with initial condition u (x, 0) = x (4 - x) up-to t = 6. Solve $u_{xx} = 2u_t$ assuming $\Delta x = h = 1$. (7)

b) Solve the equation $\Delta^2 U = -10(x^2+y^2+10)$ over square with sides x=0=y, x=3=y with U=0 on the boundary and mesh length = 1 (8)

7 Write short notes (any two) (5+5)

a) Ill Conditioned system

b) Numerical method vs Analytical Method

c) Errors in numerical calculations

d) Matrix and its properties