

POKHARA ENGINEERING COLLEGE

Internal Assessment Examination

Level: Bachelor

Semester - Fall

Year : 2024

Programme: Computer

Full Marks: 100

Course: Advance programming in java

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 class. How do you create a class in Java? Differentiate class with interface. (1+2+4)
b) Explain Design patterns and types in details ? (8)
2. a) Why CORBA is important? Compare CORBA with RMI. (4+4)
b) What is servlet? Write a simple JSP file to display "Pokhara Engineering Collage" five times. (2+5)
3. a) What is Java Mail API ? How can you use this API to send email messages? (3+4)
b) What is row set? Explain cached row set in detail. (4+4)
4. a) Why do we need swing components ? Explain the uses of check boxes and radio buttons in GUI programming. (4+4)
b) How can we use listener interface to handle events? Compare listener interface with adapter class. (3+4)
5. a) How do you handle HTTP request (GET) using servlet? (8)
b) Compare JavaFX with swing. Explain HBox and BBox layouts of JavaFX. (3+4)
6. a) How do you execute SQL statement in JDBC? (8)
b) Discuss grid layout with example. (7)
7. Write short notes on: (any two) 5*2
a) Multithreading
b) JSP

POKHARA ENGINEERING COLLEGE
INTERNAL ASSESSMENT

Level: Bachelor

Programme: B.E. Computer

Course: Research Fundamentals

Semester - Spring

Year : 2023

Full Marks: 100

Time : 3 hrs.

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.

- | | | |
|------------------------------------|---|---|
| 1a. | Why do we need research? Explain the types of research. | 8 |
| 1b. | What are the types of research question? How do you ensure data validity and reliability? X | 7 |
| 2a. | Differentiate between project and research. Explain SP's in research. | 7 |
| 2b. | A call for application has been announced for a research proposal submission to the university students. Write a draft of research proposal with suitable components. | 8 |
| 3a. | Suppose you are performing a literature review for a study. What are the considerations required for proper literature review? | 8 |
| 3b. | Describe different citation styles with suitable examples. | 7 |
| 4a. | Define plagiarism. What are the different types of data generation methods. | 7 |
| 4b. | Define research problem. How do you select a good research problem? | 7 |
| 5a. | What is qualitative data? How do you analyse the qualitative data? | 8 |
| b. | Who are the participants in research? Explain the responsibilities of an ethical researcher? | 7 |
| 6a. | What is research report? What are the components of research report? | 8 |
| b. | Explain scientific research process. | 7 |
| Write Short notes on: (Any Two) 10 | | |
| X a. | Informed Consent | |
| X b. | Characteristics of good research title | |
| c. | Research hypothesis | |

Pokhara Engineering College
Level : Bachelor
Programme : BE Computer
Course : Applied Maths

Semester : 2024 Spring

Full Mark : 100
Pass Mark : 40

Time : 3 hrs.

Candidates are required to give their answers in their own words as far as practicable. Figures in margin indicate full marks.

Attempt all the questions

- 1) a) Define harmonic function. Verify that $u = \cos x \cosh y$ is harmonic and its harmonic conjugate. (8)
- b) Integrate the function $f(z) = \frac{1}{z^2+4}$ over the given contour clockwise where c is the ellipse $4x^2 + (y - 2)^2 = 4$. (7)
- 2) a) State Cauchy Residue theorem. Evaluate $\int_c \frac{z+1}{z^4-2z^3} dz$ where $c: |z| = \frac{1}{2}$ counterclockwise. (8)
- b) Find the Taylor and Laurent's series of $f(z) = \frac{2z-3i}{z^2-3iz-2}$ in the region
(i) $0 < |z| < 1$ (ii) $|z| > 2$ (7)
- 3) a) Find the Z-transform of $e^{\frac{in\pi}{2}}$ and then deduce the value of $Z(\cos \frac{n\pi}{2})$ and $Z(\sin \frac{n\pi}{2})$. (8)
- b) State and prove first shifting theorem of Z-transform. Use it to evaluate $Z(na^n)$ and $Z(e^{-at})$. (7)
- 4) a) Find the inverse z-transform of $F(z) = \frac{3z^2+2z+1}{z^2+3z+2}$ (8)

OR

Solve using Z-transform

$$y_{n+2} - 3y_{n+1} + 2y_n = 4^n, y_0 = 0, y_1 = 1$$

- b) Derive one dimensional wave equation of a string of length L which is fixed in two end points with necessary assumptions. (7)

OR

Find the solution of one-dimensional heat equation $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$ with initial temperature $f(x)$ and boundary conditions $u(0, t) = 0$ and $u(L, t) = 0$.

- 5) a) Solve by using separation of variables

$$(i) u_x + u_y = 0 \quad (ii) u_{xy} - u = 0. \quad (8)$$

- b) Express the Laplacian in polar coordinate system from cartesian coordinate system. (7)

OR

Find the temperature distribution in a laterally insulated thin copper bar ($c^2 = 1.158 \text{ cm}^2/\text{sec}$). 100cm long and of constant cross section whose end points at $x = 0$ and $x = 100$ are kept at 0°C and whose initial temperature is

$$(i) f(x) = \sin(0.01) \pi x \quad (ii) f(x) = \sin^3(0.01) \pi x$$

- 6) a) Show that:

$$\int_0^\infty \left[\frac{\cos x\omega + \omega \sin x\omega}{1+\omega^2} \right] d\omega = \begin{cases} 0 & \text{if } x < 0 \\ \frac{\pi}{2} & \text{if } x = 0 \\ \pi e^{-x} & \text{if } x > 0 \end{cases} \quad (8)$$

- b) Find the Fourier cosine transform off $f(x) = e^{-mx}; m > 0$ and then show that $\int_0^\infty \frac{\cos kx}{1+x^2} dx = \frac{\pi}{2} e^{-k}$ (7)

- 7) Attempt anytwo (2×5=10)

- a) Show that $z\bar{z}$ is not an analytic function.
- b) Find the location & order of zeros of $(z^2 + 1)(e^z - 1)$.
- c) Verify $u = e^{-t} \sin x$ to satisfy one dimensional heat equation.

POKHARA ENGINEERING COLLEGE
Internal Assessment Examination

Level: Bachelor Semester - Spring Year :2024
 Programme: Computer Full Marks: 100
 Course: Computer Architecture(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.

7. Write short notes on **any two:**
 a) RISC vs CISC
 b) VHDL
 c) Floating Point Representation

2x5

Good Luck

1. a) Discuss the term Computer Architecture. Explain different addressing modes with appropriate figures and example of each. 2+6
- b) Define RTL. Explain different microoperations used in computers. 2+5
2. a) Define register. Explain about the register organization in detail. 2+6
- b) Explain in brief about different microinstructions used in different sub cycles. 7
3. a) Perform $-13 * -15$ using Booth's algorithm. 7
- b) Explain and design a 4-bit ALU. 8
4. a) Compare and Contrast between Hardwired and Microprogrammed Control Unit. 7
- b) Explain the different sequencing techniques in Microprogrammed Control Unit. 8
5. a) Why is Cache Memory called influential memory? Explain how Set Associative Mapping overcomes the drawbacks of Associative and Direct Mapping. 2+6
1+6
- b) Define DMA? Explain how DMA overcomes the limitations of Interrupt Driven I/O and Programmed Driven I/O. 2+6
6. a) A non-pipeline system takes 100 ns to process a task. The same task can be processed in a six-segment pipeline with time delay of each segment in the pipeline is as follows; 20 ns, 25 ns, 30 ns. Determine the speed of ratio of pipeline for 100 tasks. 7
- b) Define multiprocessing. Classify and explain computers in accordance to Flynn's classification. 2+6

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Pokhara Engineering College

Internal Assessment

Program : Computer
 Level : Bachelor
 Year : 2024
 Subject : Theory of Computation (New)

FM: 100
 PM: 45
 Semester: IV
 Time: 3 hrs

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks. Neat and clean writing are extra credited.

Attempt all the questions.

1. a) What is the fundamental difference between DFA and NFA? 8
 Design a FA which starts with either 01 or end with 01 over the given alphabet $\Sigma = \{0,1\}$.

OR

Construct a finite automata for the following regular expression
 $a(a+b)^*bb$

- b) Convert the following NFA to its equivalent DFA:

NFA:

7

- States: $\{q_0, q_1, q_2\}$
- Alphabet: $\{a, b\}$
- Transition function: $\delta(q_0, a) = \{q_0, q_1\}, \delta(q_0, b) = \{q_0\}, \delta(q_1, a) = \{q_2\}, \delta(q_1, b) = \{q_2\}, \delta(q_2, a) = \{\}, \delta(q_2, b) = \{q_2\}$
- Start state: q_0
- Accept states: $\{q_2\}$

2. a) What are the applications of CFG? Write the context free grammar for the language given by $L = \{a^n b^n : n \geq 0\}$ 8

- b) What is ambiguous grammar? Show that given grammar is ambiguous: 7

$$S \rightarrow mCnS \mid mCnSeS \mid a \\ C \rightarrow b$$

3. a) What is CNF? Convert below context-free grammar $G = (V, \Sigma, R, S)$ to Chomsky Normal Form, where $V = \{S, A, B\}$, $\Sigma = \{a, b\}$ 8

b)
4. a)

b)

5. a)

b)

6. a)

b)

c)

d)

g)

$$R = \{ S \rightarrow ASA \mid aB$$

$$A \rightarrow B \mid S$$

$$B \rightarrow b \mid \epsilon \}$$

4. b) Design a PDA that accepts the language $L = \{a^n b^m : n \geq m\}$. 7
- a) State pumping lemma for CFL. Show that $L = \{a^n b^n c^n : n > 0\}$ is not a CFL. 8
- b) Explain and illustrate with an example why the Halting Problem is undecidable. 7
5. a) Explain the basic model of a Turing machine. Design Turing machine that accepts the language $L = \{x^n y^n \mid n \geq 1\}$. 8

OR

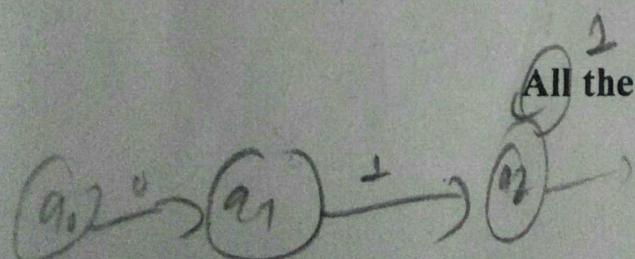
Define a UTM. Explain about encoding for a UTM with a suitable example.

- b) Show, with a suitable example, that TM can be constructed as a transducer 7
6. a) What are Tractable and Intractable problem? Explain the NP complete and NP hard problems with suitable examples. 8
- b) Differentiate between Recursive Language and Recursive Enumerable language. Also, write the properties of these languages. 7

7. Write short notes on: (any two) 10

- a) Relation and function
- b) State minimization of DFA.
- c) TM Extensions
- d) Induction proof theory

All the Best



POKHARA ENGINEERING COLLEGE
INTERNAL ASSESSMENT

Level: Bachelor
 Programme: BE Computer
 Course: Numerical Method

Semester - Spring

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) Use the Newton's Raphson method to find a root of the function. 7
 Correct up to 4 decimal places.

$$f(x) = x^3 - 4x^2 + x + 6$$

- b) Apply Secant method to find the root of the equation. Correct up to 8 decimal places.

$$x \sin x - 1 = 0$$

2. a) Find the Lagrange interpolation polynomial to fit the following data. 8

i	0	1	2	3
x_i	0.1736	0.3420	0.5000	0.6428
$e^x - 1$	0	1.7183	6.3891	19.0855

Use the polynomial to estimate the value of $e^{1.5}$.

- b) Given the data points

x	1	2	3	4	5
y	0.5	2	4.5	8	12.5

Fit a power function model of the form

$$y = ax^b$$

(Transcendental eqn)

3. a) Use Romborg Integration to evaluate

$$\int_0^{3\pi/2} e^x \sin x \, dx$$

+ 10) :

1

+ (-2) = -20

+ (-1) = 0

b) Solve the system of equation

$$3x_1 + 2x_2 + x_3 = 10 \quad 7$$

$$2x_1 + 3x_2 + 2x_3 = 14$$

$$1x_1 + 2x_2 + 3x_3 = 14$$

by using Doolittle LU decomposition method. *Factorization.* 13

4 a) Obtain the solution of following system using Gauss-Seidel iteration method. 25

$$2x_1 + x_2 + x_3 = 5$$

$$3x_1 + 5x_2 + 2x_3 = 15$$

$$2x_1 + x_2 + 4x_3 = 8$$

b) Using Gauss-elimination with partial pivoting, solve the following set of equations 7

$$2x_1 + x_2 + x_3 - 2x_4 = 0$$

$$4x_1 + 2x_2 + 2x_3 + x_4 = 8$$

$$3x_1 + 2x_2 + 2x_3 = 7$$

$$x_1 + 3x_2 + 2x_3 = 3$$

5 a) Solve the following equation for $y(0.2)$ 8

$$\frac{d^2y}{dx^2} + 2 \frac{dy}{dx} - 3y = 6x$$

Given $y(0) = 0$, $y'(0) = 1$. Use RK method (2nd Order).

b) Use the classical RK method (4th order) to estimate $y(0.5)$ of the following equations with $h = 0.25$ 7

$$y'(x) = x + y, \quad y(0) = 1$$

6 a) Solve numerically the wave equation 8

$$f_{tt}(x,t) = 4 f_{xx}(x,t), \quad 0 \leq x \leq 5$$

with the boundary conditions:

$$f(0, t) = 0 \text{ and } f(5, t) = 0 \text{ and initial values:}$$

$$f(x, 0) = f(x) = x(5 - x), \quad f_t(x, 0) = g(x) = 0$$

b) Solve the Poisson equation 7

$$\Delta^2 f = 2x^2 y^2$$

over the square domain $0 \leq x \leq 3$ and $0 \leq y \leq 3$ with $f = 0$ on the boundary and $h = 1$

7. Write Short notes on

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~<5

- a) Bisection method
- b) Cubic spline interpolation
- c) Higher order derivatives.