Tribhuvan University
Institute of Science and Technology
2070
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Bachelor Level / Second Year/ Forth Semester/ Science
Computer Science and Information Technology (CSc.252)
(System analysis and Design)

Full Marks: 60
Pass Marks: 24
Time: 3 hours.

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

Group A

Long Answer Questions:

Attempt any two: (2x10=20)

1. Mention the key steps of system development life cycle and explain each steps with example.

2. What are the key steps for designing E-R diagram? Explain with example.

3. Develop a decision tree and a decision table for the following:
The gatekeeper at ABC park is given the following instructions for admitting persons to the park:
   - If the person is under three years of age, there is no admission fee.
   - If a person is under 16, half the full admission is charged and this admission is reduced to a quarter of full admission if the person is accompanied by an adult (the reduction applies only if the person is under 12).
   - Between 16 and 18, half the full admission fee is charged if the person is a student; otherwise the full admission is charged.
   - Over 18, the full admission fee is charged.
   - A discount of 10 percent is allowed for a person over 16 if they are in a group of 10 or more.
   - There are no student concessions during weekends. On weekdays under – 12s get one free ride.

Group B

Short Answer Questions:

Attempt any eight: (8x5=40)

4. What are the types of Information System?

5. Differentiate between physical DFD and logical DFD.

6. What do you mean by database normalization? Why it is important?

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7. Why feasibility analysis is necessary before designing a system?

8. Explain modeling tools.

9. Explain with example of tangible and intangible benefit.

10. What do you mean by Quality assurance? Explain with example.

11. Comparison between corrective, adaptive, perfective and preventive maintenance.

12. Differentiate between object modeling and Dynamic modeling.

13. What are the main deliverable from testing and installation?

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Bachelor Level / Second Year/ Forth Semester/ Science
Computer Science and Information Technology (CSc.254)
(Computer Graphics)

Full Marks: 60
Pass Marks: 24
Time: 3 hours.

Candidates are required to give their answers in their own words as for as practicable.
All questions carry equal marks.

Attempt all the questions.

1. What is random scan system? Explain the operation of simple random scan with architecture.

2. Write a procedure to fill the interior of a given ellipse with a specified pattern.

3. Show that two successive reflections about any line passing through the coordinate origins equivalent to a single rotation about the origin.

4. What do you mean by line clipping? Explain the procedures for line clipping.

5. Illustrate the windows to view point transformation with an example.

OR

Write a procedure to implement highlighting as a blinking operation.

6. Why polygon description is consider as standard graphics objects? Explain the importance of polygon table.

7. Model the Bezier curve. Explain the importance of Bezier curve in graphical modeling.

OR

Write a procedure to perform a two-point perspective projection of an object.

8. What is solid modeling? Explain the basic procedures for solid modeling.

9. Explain the area subdivision method for visible surface detection.

10. Explain the basic steps for computer animation.

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Bachelor Level / Second Year/ Forth Semester/ Science
Computer Science and Information Technology (CSc.253)
(Database Management System)

Full Marks: 60
Pass Marks: 24
Time: 3 hours.

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

Attempt all the questions.

1. (a) What is database management system? Discuss the advantages of using database management system over file system. (2+3=5)

   (b) What is data abstraction? Discuss three levels of this abstraction. (1+4=5)

2. (a) Construct an ERD to record the marks that students get in different exams of different course offerings. (5)

   (b) Define integrity constraint? Discuss domain constraint with suitable example. (1+4=5)

3. (a) With the information given bellow, calculate any three members of F^+. (6)
   R = (A, B, C, G, H, I)
   F = {A -> B, A -> C, CG -> I, B -> H}

   (b) Discuss 2NF and 3NF with suitable example. (4)

4. Consider the following supplier database, where primary keys are underlined: (20)

   supplier (supplier-id, supplier-name, city)
   supplies (supplier-id, part-id, quantity)
   parts (part-id, par-name, color, weight)

   Construct the following relational algebra queries for this relational database

   (a) Find the name of all suppliers located in city "Kathmandu".
   (b) Find the name of all parts supplied "ABC Company".
   (c) Find the name of all parts that are supplied in quantity greater than 300.
   (d) Find the number of parts supplied by "ABC Company".
   (e) Find the name of all suppliers who supply more than 30 different parts.

5. (a) What is serializable sehedule? How can you test a schedule for conflict serializability? (2+3=5)

   (b) Discuss recovery technique base on deferred update with concurrent execution in multi-user environment. (5)

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Bachelor Level / Second Year/ Forth Semester/ Science
Computer Science and Information Technology (CSc.255)
(Introduction to Cognitive Science)

Full Marks: 60
Pass Marks: 24
Time: 3 hours.

Candidates are required to give their answers in their own words as for as practicable.
All questions carry equal marks.

Attempt all the questions.

1. Define the cognitive science and its application in computer science. Compare cognitive science with other science.

2. Explain the architecture of an expert system and its applicability in different areas.

3. Explain the various approaches and issues in knowledge representation and also explain the various problem in representing knowledge.

4. Differentiate between procedural and declaration knowledge with an example.

OR

Explain A* search algorithm with example.

5. Explain the breadth first search technique with example and also explain the benefits of it.

6. Derive the mathematical model of neural network system with example and also explain about its importance.

7. What are the steps in natural language processing? List and explain them briefly.

8. Explain the Chomsky hierarchy with example.

9. Explain the pinker approach in the cognitive science. What is its relation with Descartes? Explain.

10. Why lexicon and morphology are needed in natural language processing? Explain with example.

OR

Explain the parameter of natural language processing with its syntax and example.

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Bachelor Level / Second Year/ Forth Semester/ Science
Computer Science and Information Technology (ENG.256)
(Technical Writing)

Full Marks: 80
Pass Marks: 32
Time: 3 hours.

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

All figures in the margin indicate full marks.

Attempt all the questions.

1. Describe a few ways of organizing information. Why is it important to organize information? (10)

2. Discuss briefly how you can choose and use table, graphs and charts. (15)

3. Critique your friend's Web page and recommend revisions to prepare it for use in a job search. (15)

4. What is a summary? Describe the steps to follow to write informative summaries. (10)

5. Write a brief proposal to convince your manager to purchase a new computer for your use in the office. (15)

6. Write short notes on **any two** of the following: (15)

   (a) Writing minutes

   (b) Readability

   (c) E-mail etiquette

   (d) Technical communication

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Bachelor Level / Second Year/ Forth Semester/ Science
Computer Science and Information Technology (CSc.251)
(Theory of Computation)

Full Marks: 80
Pass Marks: 32
Time: 3 hours.

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

Group A

(8x4=32)

1. Differentiate between deterministic and non-deterministic finite automata.
2. What do you mean by pumping lemma for regular languages?
3. Explain the non-deterministic PDA with example.
4. Define turing machines. Draw NFA- $\wedge$ corresponding to following regular expression over $\Sigma = \{0, 1\}$.

   $010^* + 0\,(01 + 10)^*\,11$

5. Explain about recursive enumerable and recursive language.
6. Explain the computational complexity with example.
7. Differentiate between class P and d class NP.
8. Compare FA, NFA and NFA-$\wedge$ with illustration.

Group B

(6x8=48)

9. Define finite automata and draw FA for the strings:
10. For the following Regular expression draw an NFA - $\wedge$ recognizing the corresponding languages.
    (i) $(00 + 1)^*\,(10)^*$
    (ii) $001^*\,0^*\,11$
11. Define CFG. Prove the following CFG is ambiguous.

    $S \rightarrow S + S \mid S * S \mid (S) \mid a$

    Write the unambiguous CFG for the above grammer.
12. Draw Tuning Machine (TM) to accept Palindromes over {a, b}. (Even as well as odd Palindromes).
13. Prove that any regular language can be accepted by a finite automata with all details.
14. Explain the following:
    a) Regular grammer.
    b) Halting problem.
    c) Chomsky Hierarchy.
    d) NP-complete problem.