2018

COMPUTER SCIENCE

[Honours]

PAPER —VI

Full Marks : 100

Time : 4 hours

The figures in the right hand margin indicate marks

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

Illustrate the answers wherever necessary

[NEW SYLLABUS]

GROUP — A

Answer any **two** questions :   15 × 2

1. Alice has a large DVD movie collection. Her friends like to borrow her DVD's and she needs a way to keep track of who has what. She maintains a list of friends, identified by unique FID's

(friend identifiers) and a list of DVD's, identified by DVDID's (DVD identifiers). Each friend has a name and a telephone number which she can call to get the DVD back. Each DVD has the star actor name and title. Whenever a friend borrows a DVD, Alice enters these facts into her database along with the date borrowed. Whenever the DVD gets returned, that fact, too, gets noted along with the date returned.

(*a*) Find all entities of the above system with corresponding attributes.   3

(*b*) Identify the relationship among entities.   2

(*c*) Construct an ER Diagram.   5

(*d*) Construct suitable tables for representing the ER diagram.   5

2. (*a*) What do you mean by inheritance ? Describe different types of inheritance with schematic diagram. Describe the way of implementation of multiple inheritance in Java.   1 + 4 + 2

(*b*) Describe method overloading and overriding with examples. Write differences between them. What is dynamic dispatch ?   5 + 2 + 1

3. (a) State the Arden's theorem prove that

$$P + PQ*Q = ba*Q*$$

where $P = b + aba*$ and P, Q are any regular expression, a, b are terminal symbols. 2 + 3

(b) Convert the following mealy machine to corresponding moore machine. 5

Present state	Next State			
	$a = 0$		$a = 1$	
	State	Output	State	Output
→q_0	q_3	0	q_1	1
q_1	q_0	1	q_3	1
q_2	q_2	1	q_2	0
q_3	q_1	0	q_0	1

(c) Construct a grammar G, generating

$$L(G) = \left\{ WCW^T \mid W \in \{a,b\}^* \right\}$$

3

(d) Write differences between LL parser and LR parser. 2

4. (a) Briefly describe DDA line drawing algorithm. Illustrate step by step to draw a line from (0, 0) to (4, 6) using DDA line drawing algorithm.   5 + 5

    (b) Construct the DFA with reduced states equivalent to the regular expression :   5

    $$RE = 10 + (0 + 11)0^*1.$$

GROUP − B

Answer any **five** questions :   8 × 5

5. (a) Discuss the difference between cartesian product and Natural Join operation with suitable example.

    (b) What is the view of a database ?

    (c) Define the terms used in relational model : table, degree, cardinality, domain.   4 + 2 + 2

6. (a) Define Java Runtime Environment.

    (b) What is polymorphism ? Explain runtime polymorphism with an example.   2 + 6

7. Write down the algorithm to check if a decomposition is loss-less or not. Given $R(A, B, C, D, E)$ with FD's $F = \{AB \rightarrow CD, A \rightarrow E, C \rightarrow D\}$. Verity the decomposition of R into $R_1(A, B, C)$, $R_2(B, C, D)$, $R_3(C, D, E)$ is loss-less or not.　　8

8. (a) Describe Beam penitration method for producing colour display with a CRT.

   (b) Discuss about LED Technology.　　4 + 4

9. (a) What do you mean by Annotated parse tree.

   (b) What is symbol table ? What are the contents of a symbol table ? Discuss different data structures to implement the symbol table.
   $$2 + (2 + 1 + 3)$$

10. (a) What is class ? How does it accomplish data hiding ?

    (b) How do we invoke a constructor ?

    (c) What are the differences between constructor and method ?　　$(1 + 2) + 2 + 3$

11. (a) Describe 8-point symmetry in circles.

(b) Describe midpoint Algorithm for Circle. $3 + 5$

12. What is context free grammer ? Give an example. Find a reduced grammer equivalent to the grammer G whose production are

$$S \to AB/CA, \quad B \to BC/AB, \quad A \to a, \quad C \to aB/b$$
$$(2 + 1) + 5$$

GROUP – C

Answer any **five** questions : 4×5

13. Why is normalization used in database ? Write its drawbacks. $2 + 2$

14. What is a foreign key ? Explain with example. $3 + 1$

15. Explain the following line used under Java program

public static void main (String args [ ]) 4

16. Perform a 45° rotation of a triangle A(1, 1), B(5, 1), C(3, 5) about origin. 4

17. Write short notes on : $2 + 2$

(i) Digitizer

(ii) Light pen.

18. (*a*) What is top down parsing ? Give an example.

    (*b*) What is LL(1) grammer ? Describe with an example.   2 + 2

19. (*a*) What are the problems with BCNF ?

    (*b*) What are the main functions of DBA ?   2 + 2

20. What are the difference between abstract classes and interfaces ?   4

[*Internal Assessment* : 10 Marks]

———————