2015

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

GROUP — A

Answer *any two* questions :   15 × 2

1. (*a*) Consider a manufacturing company which
        records information about the projects it has
        on hand, the parts used in projects, the
        suppliers who supply the parts, the warehouse

in which these parts are stored, the employees who work on these projects. $2 + 2 + 2 + 4$

- (*i*) List all entities of the above system with corresponding attributes.

- (*ii*) Write down relationship among these entities.

- (*iii*) Find out primary and foreign key of these entities (if any).

- (*iv*) Draw an Entity-Relationship diagram of the system.

(*b*) Consider the following database schema and write expression for the queries given below using SQL : 1×5

> PROJECT (Project-id, Project-name, Chief-architect);
>
> EMPLOYEE(Employee-id, Employee-name, Salary);
>
> ASSIGNED-TO(Project-id, Employee-id);

(*Continued*)

(*i*) List name of employees having salary greather than Rs.10,000 or first alphabet of his name is 'A'.

(*ii*) List name of employees assigned to more than one projects.

(*iii*) Obtain details of employees working on the project named SYSTEM.

(*iv*) Get details of employee working on both projects with project-id P200 and P300.

(*v*) Find the number of employees who work on all projects.

2. (*a*) Write down predictive parsing table for the grammar : 5

$$E \rightarrow T + E \mid T$$
$$T \rightarrow int/int * T \mid (E)$$

(*b*) What do you mean by Subroutine linkage ? Explain. 5

(*c*) Write down some applications of Computer Graphics. 5

3. (a) Draw the flowchart of a two-pass assembler. Write down the four basic tasks for any macro instruction processor. What is conditional macro ? 2 + 4 + 1

(b) Consider the grammer -

$$S \rightarrow E\$$$
$$E \rightarrow E + E/E * E/(E)/I$$
$$I \rightarrow Id/d \text{ (d stands for any integer)}$$

Generate the syntax directed translation scheme for the above grammar to compute

$$(53 * 4 + 5) * 2\$$$ 4

(c) Differentiate between context sensitive and context free grammar. 4

4. (a) Write down the DDA line drawing algorithm. What are the advantages and disadvantages of this algorithm ? 5 + 2 + 2

(b) What is loss-less join decomposition ? Consider a relation R(A, B, C, D) with functional dependencies $A \rightarrow B$, $A \rightarrow C$,

$C \rightarrow D$ that is decomposed into $R_1(A, B, C)$ and $R_2(C, D)$. Verify wheather it is loss-less or not ? $\qquad$ $2 + 4$

GROUP – B

Answer *any five* questions : $\qquad$ 8×5

5. (*a*) What are the differences between raster-scan and random-scan display ? What is refresh rate ? $\qquad$ $3 + 1$

(*b*) Describe a simple CRT with a diagram. $\qquad$ 4

6. (*a*) Compare quadruple, triple and indirect triple representations. $\qquad$ 2

(*b*) Translate the expression $X = (A + B)^* - c/d$ into quadruple, triple and indirect triple representation. $\qquad$ $2 + 2 + 2$

7. Construct a DFA that recognises balanced sequences of parenthesis with a maximal nesting depth of 3, eg, E, ( ) ( ), (( ) (( ))) or (( ) ( )) ( ) ( ) but not (((( )))), or (( ) (( ) (( )))). $\qquad$ 8

8. (a) Consider the following grammar :

$$S \rightarrow a \,/\, \wedge \,/\, (T)$$

$$T \rightarrow T, S/S$$

Draw a parse tree for $((a, a), \wedge), a)$.   4

(b) Consider the program segment

```
prod : = 0 ;
id    : = 1 ;
do
    begin
        prod : = prod + a[in] + b[in] ;
        in : = in + 1 ;
    end
  while in <=25 ;
end
```

Represent the basic block and flow graph for the above program segment.   4

9. Briefly describe, circle generation concept in computer graphics. Write down Bresenham's algorithm to draw a circle.   3 + 5

10. (*a*) Explain shearing in 2D-Transformation.　　3

　　　(*b*) Compare two technology : LCD & LED.　　5

11. Describe "compile-and-Go" loader. What are the disadvantages of it. What are the differences between linkage editor and linking loader ?　　8

12. Consider the following schema and write expression for the queries given below using relational algebra.

HOTEL(Hotel-no, Name, Address)

ROOM(Room-no, Hotel-no, Type, Change)

BOOKING (Hotel-no, Guest-No, Date-from, Date-to, Room-no)

GUEST(Guest-no, Name, Address)

　(*i*) List the name and address of all guest.

　(*ii*) List the price and type of all rooms at the GRANT hotel.

　(*iii*) List all guests currently staying at the TAJ Hotel.

　　　　　　　　(*Turn Over*)

(*iv*) List the guest details of all guest staying at the TAJ Hotel. 2×4

GROUP — C

Answer *any five* questions : 4×5

13. Briefly explain Plasma Panel display.   4

14. Construct a DFA accepting all strings Z over { a, b }, such that the number of b's in Z is 3 mod 4.   4

15. Explain window port and view port with diagram.   4

16. Describe aggregation with example.   4

17. Define critical Fusion Frequency and Resolution of a monitor.   4

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

    (*i*) Light pen

    (*ii*) Digitizers.

19. What do you mean by ambiguous Grammar ? How can you check the ambiguity of any Grammar ?

    2 + 2

20. Consider a relation R with FDs

    $$F = \{ A \rightarrow BCD, BC \rightarrow AD, D \rightarrow B \}$$

    Find the highest normal form.   4

    [*Internal Assessment* : 10 Marks]

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