RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

B.A./B.Sc. FIFTH SEMESTER EXAMINATION, DECEMBER 2014

THIRD YEAR

Date : 20/12/2014 **COMPUTER SCIENCE (Honours)**

Time : 11 am – 3 pm **Paper :** V Full Marks : 100

[Use a separate Answer book for each Group]

Group – A

*(Answer **any four** questions)* [4×10]

1. Design an Entity-Relationship diagram for a multiplex theater. You must consider both online & offline booking of tickets. You have to include food counter where from viewers could purchase foods. You could include other events if required. Choose the relevant entities and define the mapping cardinalities. Write your assumption of your ER diagram. [10]

2. a) Illustrate the difference between relation schema and relation instance. [3]
   b) Draw the network model for the given relational model. [4]

EMP

Eno	Ename	Dno	Sal
E01	ASIT	10	10000
E02	BABU	20	20000
E03	TAMAL	10	30000

DEPT

Dno	Dname	Loc
10	HR	KOL
20	IT	MUM
30	FIN	BAN

   c) Can a relation have more than one foreign key? Explain with the help of an example. [3]

3. a) What is the implication of referential integrity? [3]
   b) Express natural join operation in terms of basic relational algebra operations. [3]
   c) Consider an relation schema R(A,B,C) with a set of functional dependencies $\{AB \to C; C \to A\}$. Show that R is in 3NF but not in BCNF. [2]
   d) Discuss various access privileges that a user can have on a relation. [2]

4. Consider the following schema of a relational database.
   employee (emp_no, name, address)
   project (p_no, p_name)
   work-on (emp_no, p_no)
   part (part_no, part_name, qty_on_hand, size)
   use (emp_no, p_no, part_no)
   a) Answer the following queries in relational algebra.
      i) Print the name of the employees who are working on a project named "DBMS".
      ii) Print the name of the employees who are not working in any project. [2+2]
   b) What are the components of a tuple relational calculus expression? Explain with an example. [2]
   c) When is an expression in tuple relational calculus said to be unsafe? Explain with an example. [2]
   d) Consider a relation R(A,B,C,D,E) with the following functional dependencies.
      $A \to BC;\ CD \to E;\ B \to D;\ E \to A.$
      List two (2) candidate keys of R. [2]

5. a) Critically comment : "Normalizing a relation means decomposition of the relation into sub relations". [2]

b) What is the highest normal forms of each of the following relations?

i) $R_1(A, B, C, D)$ with $A \rightarrow BC;\ CD \rightarrow B.$

ii) $R_2(A, B, C)$ with $A \rightarrow B;\ A \rightarrow C;\ C \rightarrow B.$ [3+2]

c) What do you mean by attribute preservation? [3]

6. a) Size of each record in database is S size of each data block in memory is D. How many data blocks are required to store total N records? [2]

b) Take atleast 4 records in prime area and atleast 2 records in overflow area. Organize an index sequential file organization by showing the records in prime area, overflow area & in Index. [5]

c) Construct B^+ tree of order 3 for the following values :
50, 70, 60, 90, 30, 80 [3]

7. a) "Binary search is unsuitable for searching a record in sparse index"—comment on it. [2]

b) What are the advantages of having an index on a file? List the different types of single level indexes available. [2]

c) Write algorithm/steps for insertion and deletion in primary index. [6]

Group – B

Answer **any one** question : [1×5]

8. Discuss the use of ALE signal in 8085 for multiplexing of address and data bus. [5]

9. Explain different types of addressing mode of 8085. [5]

Answer **any three** questions : [3×10]

10. a) Describe programming model of 8085 microprocessor.

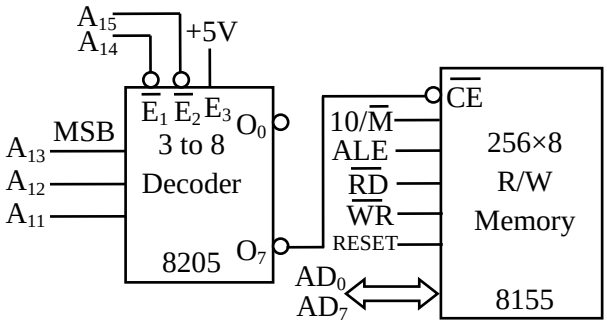
b) Explain the different types of Interrupt present in 8085. [7+3]

11. a) Explain how a delay with register pair can be prepared with example?

b) Draw and explain timing diagram of LXI instruction.

c) What is bus idle machine cycle? [4+5+1]

12. a) Explain the decoding logic and memory address range for the interfacing chip given in the following diagram:



b) Explain the execution of RIM and SIM instruction in brief. [6+(2+2)]

13. a) Write an assembly language program in 8085 to find the square root of a perfect square number,

b) Why 8255 is called a programmable device?

c) What is BSR mode operation of 8255? [6+2+2]

14. a) What is the use of 8279 IC—Explain in brief.

b) Describe different segment registers of 8086.

c) Define Peripheral mapped IO and Memory mapped IO. [2+5+3]

Group – C

Answer **any one** question : [1×5]

15. Describe the criterias behind selecting an appropriate life cycle model for a project. [5]

16. Draw a Interaction Diagram for the ATM machine. [5]

Answer **any two** questions : [2×10]

17. a) Explain the prototype model of software development.
    b) What are the three different types of project according to COCOMO?
    c) Write down the expression for cost estimation in in basic COCOMO. [5+3+2]

18. a) Compare functional and non-functional requirement of an SRS with proper example.
    b) Explain decision tree and decision table.
    c) What is the advantage of fourth generation programming languages? [4+4+2]

19. a) What do you mean by association among classes? Give proper example.
    b) Write a short note on SQA (Software Quality Assurance).
    c) Draw an DFD for a "Online Shopping System". [4+2+4]

20. a) What do you mean by validation and verification?
    b) Describe two main approaches of Black Box testing.
    c) Determine the cyclometric complexity of the following function :

```
int find_max (int i, int j, int k)
{
    int max ;
    if (i > j) then
        if (i > k) then max = i
                else max = k;
        else if (j > k) max = j;
                else max = k;
    return (max);
}
```

[2+4+4]

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