ABV- Indian Institute of Information Technology & Management, Gwalior

Mid-Semester Examination (BCS and BMS III[rd] Semester)

Course Title: Database Systems (CS-204)

MM: 30 **Duration: 2 Hour**

Note:

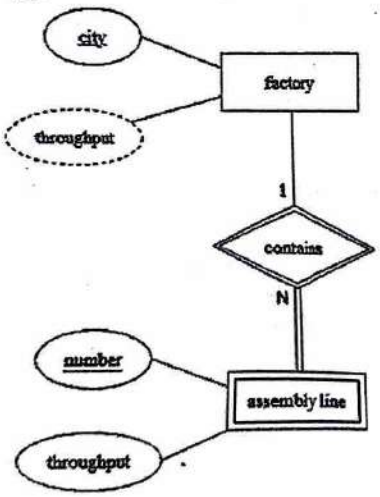
1. Please follow all the *Instructions* given on the cover page of the answer book.
2. All parts of a question should be answered consecutively.
3. All the questions are compulsory.

Q.1 Answer the following briefly. **(1M x 5 = 5M)**

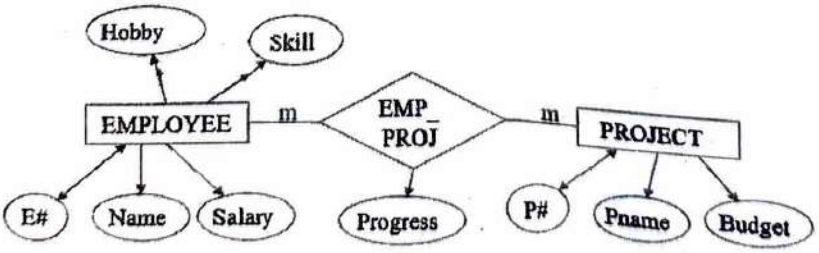
a. Candidate Key
b. Cardinality and Degree of a relation
c. Total participation of entity in a relationship
d. Data Model
e. Domain of an attribute

Q.2 The following ER diagram examples are given. Convert them into the Relations (Tables) with all the information. **(2M x 3 = 6M)**

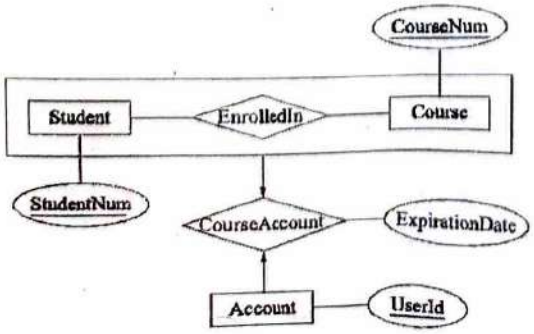
(a)



(b)



(c)



Q.3 The following relation schema is given: **(2M x 3 = 6M)**

Employee (Fname, Minit, Lname, SSN, Bdate, Address, Sex, Salary, Super_SSN, Dno)

Department (Dname, Dno, Mgr_SSN, Mgr_start_date)

Dept_locations (Dno, Dlocation)

Works_on (Essn, Pno, Hours)

Project (Pname, Pnumber, Plocation, Dnum)

Dependent (Essn, ~~Department~~ dependent_name, sex, Bdate, Relationship)

Answer the following queries in Relation Algebra (RA).

(a) Retrieve the name and address of all employees who work for the 'Research' department.

(b) Retrieve the names (Dname) of departments that have locations in 'Houston'.

(c) Retrieve the first (Fname) and last (Lname) names of employees who have dependents with a Relationship of 'Son' or 'Daughter'.

Q.4 (i) Let a relation R = {A,B,C,G,H,I}. The set of FDs = {A→B, A→C, CG→H, CG→I, B→H}. Prove or disprove the following: (Explicitly mention the rule that is used to prove/disprove) **(3M)**

(a) A→H, (b) CG→HI, (c) AG→I.

(ii) Let R = {A,B,C,D,E} and FDs = {AB→C, A→D, D→E, AC→B} **(3M)**

List all the candidate keys, prime attributes, and non-prime attributes.

Q.5 (i) What is the need for the normalization of a database schema? Mentioned all types of normal forms with their necessary entry and exit conditions. **(5M)**

(ii) What normal form is the following relation is (Only H and I together is the key) **(2M)**

stuff(H, I, J, K, L, M, N, O), FDs are:

HI→JKL

J→M

K→N

L→O