

<p>Mansoura University</p>		<p>Department: Computers Engineering And Systems</p>	<p>Faculty of Engineering</p>
<p>Total Marks: 110 Marks</p>			

<p>Course Title: Data Processing 1 Date: Jan 17, 2012 (First term)</p>	<p>Course Code: C 3412 Allowed time: 3 hrs</p>	<p>Year: 4th No. of Pages: (2)</p>
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Remarks: (Answer the following questions... assume any missing data)

Question No. (1) (25 Marks)

(Q1- A) [10 points] What is the relation between the following pairs

- (i) DB Engine and DB Servers
- (ii) DBMS and DB Engine
- (iii) Integrity and Integration
- (iv) Index key and primary Key
- (v) Base table and Derived table

(Q1- B) [3 points] List Advantages of DBMSs in the case of using Flat file system DBS model?

(Q1 - C) [3 points] State the most important function of the DBMS for each one specify its corresponding level in the 3 level Architecture

(Q1-D) [3 points] List the different ways of implementation of the Client/Server Architecture?

(Q1-E) [3 points] List Advantages of DBMSs in the case of using Flat file system DBS model?

(Q1-F) [3 points] What is the relation between the Database engine, database applications, Database builder and DBMS? (Use Microsoft ACCESS Software package and Visual Basic environment as examples in your discussion). Give some examples of the most famous D.B engines. Then state how can you benefit from these engines.

Question No. (2) (16 Marks)

(Q2-A) [4 points] Specify the most important criteria for selecting DBMS in your D.B application.

(Q2-B) [4 points] What is it meant by the system table? If the RDB supports other types, list these types.

(Q2-C) [4 points] list the most important Vendor-provided tools of DBMS

(Q2-D) [4 points] What is the relation between the Database engine, database applications, Database builder and DBMS? (Use Microsoft ACCESS Software package and Visual Basic environment as examples in your discussion). Give some examples of the most famous D.B engines. Then state how can you benefit from these engines.

Question No. (3) (35 Marks)

(Q3-A) [3 points] List the most important characteristic which can be used to describe the RDBS.

(Q3-B) [4 points] Different vendors provides us with a variable size of DBMS, specify the reasons of such variation (which size you prefer DBMS with large size or that with small size)

(Q3-C) [8 points] Write the equivalent relational algebra statement(s) for following next statement

$$\prod_{Patient_name} (Patient \bowtie_{Dob = sp_dob} (\sigma_{op='cancel'}(Past)))$$

Q3-D) [20 points] Design an E/R diagram for the following situation: We wish to model airports, airlines, cities, and flights in the United States. Each airport is located in a unique city. A city can have many airports (e.g., Washington DC has three airports). Each city must have at least one airport (we will model only major cities in our database, so this condition is realistic). Assume that airport names are unique and that city names are also unique. Airlines are the companies that run flights (e.g., United, Delta, etc.). An airline is uniquely distinguished by its name. Every flight is operated by a unique airline. Flights have numbers but these numbers are unique only within an airline (e.g., both Delta and SAS have flights numbered 3785). Flights run from one airport to another, perhaps with stopovers and brief landings (for fueling purposes). For each flight, we wish to store its airport of origin and airport of destination, and also the origin and destination times (assume that all flights fly on all days, so we don't have to record days). In addition, information needs to be stored about the airports where stopovers and brief landings are made (and the times these are made) for each flight. Try to model as much as you can and write *Notes*, if necessary.

Question No. (4) (30 Marks)

Q4-A) [3 points] What is meant by normalization, then specify its objectives?

ClientNo	CName	PropertyNo	Address	rentStart	rentFinish	rent	ownerNo	OName
CR76	John kay	PG4	6 lawrence St.Glasgow	1-Jul-00	31-Aug-01	350	CO40	Tina Murphy
		PG16	5 Novar Dr. Glasgow	1-Sep-02	1-Sep-02	450	CO93	Tony Shaw
CR56	Aline Stewart	PG4	6 lawrence St.Glasgow	1-Sep-99	10-Jun-00	350	CO40	Tina Murphy
		PG36	2 Manor Rd. Glasgow	10-Oct-00	1-Dec-01	370	CO93	Tony Shaw
		PG16	5 Novar Dr. Glasgow	1-Nov-02	1-Aug-03	450	CO93	Tony Shaw

Q4-B) [18 points] If the previous table is in non-normal form – specify why ; then use the various Normalization steps to convert it to normal form

Q4-C) [8 points] For the next schema: TEAMS (TName, TCity); PLAYERS (PName, Team, Salary)

GAMES (HomeTm, AwayTm, Date, HomePts, AwayPts)

(I) List the names of all the teams who have hosted games against every team from Sydney.

(II) List the names of all the teams who have won every game that they have played at home.

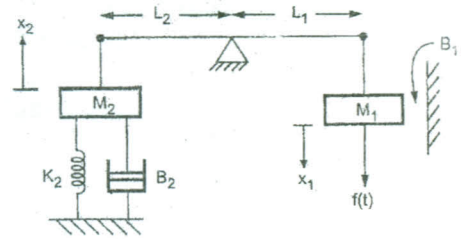
Q4-C) [8 points] Explain how A relational database management system (RDBMS) do the following?

I- Provide mechanisms to help protect the integrity of the data.

II-Ensure that relational schema are in at least 3NF.

Q4- D) [3 points] For any relational database table, the set of attributes in the table must be sufficient to produce at least: ___ candidate key(s), ___ primary key(s) and ___ foreign key(s)

- 1-a Using MATLAB only plot the time response $X_1(t)$ and $X_2(t)$ on one diagram every 0.01 sec. over the interval $0 \leq t \leq 10$ sec. , when a step force of 10 N is applied , assuming $M_1=0.1$ kg , $M_2=0.2$ kg , $K_2=4$ N/m $B_1=0.3$ N.S/m , $B_2=0.4$ N.S/m , and $(L_1/L_2) = 0.8$.



- 1-b A control systems with transfer functions $G1(s)$ and $G2(s)$ are given by the state space models

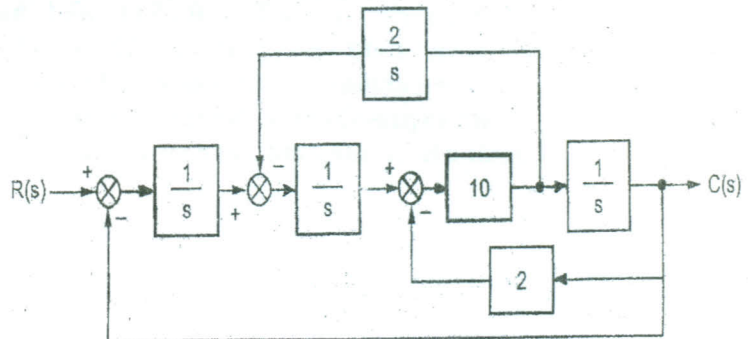
$$A1 = \begin{bmatrix} 0 & 1 \\ -3 & -5 \end{bmatrix}, B1 = \begin{bmatrix} 0 \\ 1 \end{bmatrix}, C1 = [1 \quad 2], D1 = [0], \text{ and}$$

$$A2 = \begin{bmatrix} -3 & 1 \\ 0 & -4 \end{bmatrix}, B2 = \begin{bmatrix} 0 \\ 4 \end{bmatrix}, C2 = [3 \quad 0], D2 = [2], \text{ using MATLAB only}$$

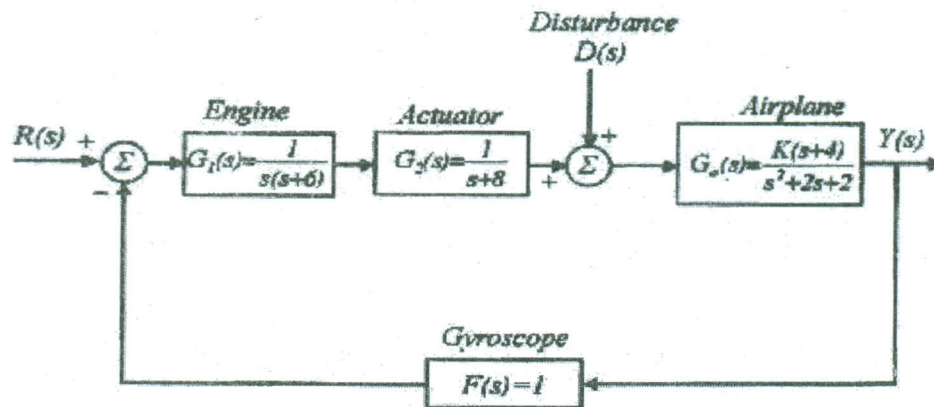
Find the state space model for the system whose transfer function is given by :

$$T(s) = \frac{G1(s)}{1 + G1(s)G2(s)}$$

- 2-a For the shown block diagram
Using MATLAB only
i- find the transfer function
ii- Plot the response curve when
the input is
 $r(t) = 2t^2 - 5t + 6, 0 \leq t \leq 10$



- 2-b An automatic piloting for supersonic airplanes, which assists the aerodynamic stability of the plane, thus making the flight more stable and more comfortable. A simplified block diagram of this system is shown . The aircraft dynamics are approximated by a second order system , where K is a parameter which changes according to flight conditions. Assume that there are no disturbances. Construct the closed loop system root locus using MATLAB.



3-a Write short notes on:

Types of thyristor.
Types of commutation.
Principle of phase control.
Switching mode regulators.

- 3-b** A single-phase ac voltage unidirectional controller has a resistive load of $R=10\ \Omega$, and the input voltage $V_s=120\ \text{V(rms)}$, the delay angle of the thyristor is $\alpha=60^\circ$.
- i- derive a mathematical expression for the input power factor.
 - ii- find the average output voltage and the rms value of output voltage .

4-a Write the differences between:

dv/dt and di/dt protection.
Step up and step down DC chopper.
Unidirectional and Bidirectional controller.

- 4-b** A 15-hp 220V 2000 rpm separately excited dc motor controls a load requiring a torque of $T_L=45\ \text{N.M}$ at a speed of 1200 rpm. The field circuit resistance is $R_f=147\ \Omega$, the armature circuit resistance is $R_a=0.25\ \Omega$, and the motor voltage constant $K_v=0.7032\ \text{V/A-rad/sec}$. If the field voltage is $V_f=220\ \text{V}$. The viscous friction and no-load losses are negligible. The armature current may be assumed continuous and ripple free.
- * Derive an expression for the speed of the separately excited dc motor .
 - * Determine both the armature voltage and rated current of the motor.