**Eastern Mediterranean University - Computer Engineering Department**

**Software Engineering Program**

**CMSE-201 Fundamentals of Software Engineering - Midterm Exam**

**Std Id\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Std Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Instructor: Assoc. Prof. Dr. Alexander G. Chefranov**

**Duration: 110 Minutes December 1, 2018**

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**Three A4 sheets of paper with *your* *handwritings* (not photocopies, printouts, etc.) may be used for your help. Electronic devices are not allowed**

**There are 6 questions (totally, 100 points), 8 pages**

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| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | **Total** |
| **17** | **17** | **17** | **17** | **17** | **15** | **100** |
|  |  |  |  |  |  |  |

**Good Luck!**

**Q1) (17 points)** Specify two functional requirements, FR1, FR2, for the Online Library System (ORAS), as user and system requirement for each of them, filling in the table below. Specify actors of OLS related with FR1 and FR2. For one of the requirements, FR1 or FR2, design a test plan in the form: (test name, test inputs, expected test outputs)3

|  |  |  |
| --- | --- | --- |
|  | Functional Requirement FR1Actor(s): Reader (3+4) | Functional Requirement FR2Actor(s): Any actor |
| User requirement | Reader can select a book he interested in and order it | Actor logs in the system providing his user name and password |
| System requirement | Student Reader orders books on a subject of his interest’ so that * list of available book categories is displayed in an alphabetical order;
* Reader selects the most appropriate categories;
* Reader is asked entering keywords;
* Book titles from the selected categories having in their titles the keywords entered are displayed in the order of the categories selected;
* Reader selects books from the list displayed ;
* The books selected are ordered by the Reader;
* The books ordered are delivered to the Reader;
 | When logging in a user provides his user name and password given to him by sysadmin. The password shall be changed on the first log-in. The password symbols are not displayed when being entered. For security reasons, a password shall contain at least 8 symbols from different sets as letters, digits, special characters, etc. |

Test of FR1:

|  |  |  |
| --- | --- | --- |
| # | Input | Output |
|  | Categories are requested by Reader | Categories are displayed by OLS on the request (Mathematics, Physics, Computer Science,..) |
|  | Categories are selected (Computer Science) | Selected categories are received by OLS (Computer Science) |
|  | OLS keywords related with Computer Science (Theoretical Computer Science, Computer Systems, Computer Applications, Software Engineering, ..) | Software Engineering is selected |
|  | Book titles of the Computer Science with keywords selected Software Engineering are displayed by OLS (Sommerville, I., Software Engineering, 8th Ed., ISBN 7-111-19770-4, 2006;Pressman, R.S., Software Engineering: A Practitioner Approach, 5th Ed., ISBN -07-365578-3, 2001; ..) | Book titles are selected by Reader (Sommerville, I., Software Engineering, 8th Ed., ISBN 7-111-19770-4, 2006) |
|  | Book titles selected by Reader (Sommerville, I., Software Engineering, 8th Ed., ISBN 7-111-19770-4, 2006) are ordered | Book titles selected by Reader are delivered to Reader (Sommerville, I., Software Engineering, 8th Ed., ISBN 7-111-19770-4, 2006) |

**Q2) (17 points).**  Write two non-functional requirements for OLS. For one of the requirements, describe a verification procedure using some objective measure (procedure name, procedure inputs, procedure outputs, procedure actions on decision making).

NF1: Response time to display book categories shall not take more than 30 sec

NF2: Response time to display titles of the books from the categories selected shall not take more than 30 sec

Verification procedure for NF1:

1. Take time, Ts, just before starting processing the order on the categories display
2. Take time. Te, just after the categories are displayed
3. Dur=Te-Ts
4. If Dur<=30 sec, NF1 is satisfied, else it is not satisfied

**Q3) (17 points)** For the following functional requirement to OLS “Student Reader orders books on a subject of his interest’ so that

* list of available book categories is displayed in an alphabetical order;
* Reader selects the most appropriate categories;
* Reader is asked entering keywords;
* Book titles from the selected categories having in their titles the keywords entered are displayed in the order of the categories selected;
* Reader selects books from the list displayed ;
* The books selected are ordered by the Reader;
* The books ordered are delivered to the Reader;

draw a sequence diagram. Note: Assume that the Reader is already logged in and has assigned to ID.

Reader

OLS

Display categories

Categories displayed

Display

Categories selected

Enter keywords

Display

Keywords entered

List of titles

Display

Titles selected

Books selected are ordered and delivered

Display

**Q4) (17 points)** For the functional requirement in Q3, draw a State-chart Diagram

List prepared

Keywords entered

Categories displayed

Categories displayed

Categories requested

Books delivered

Titles selected

**Q5) (17 points)** For the functional requirement in Q3, define entities, relations, and attributes, give their short descriptions (as in Data Dictionary), and draw an Entity-Relationship diagram. Specify mapping cardinality constraints (1-1, 1-m, m-1, or m-m) and give application domain-related explanations why these very constraints shall be used.

**Hint:** An entity, A, is side one (1), if for any instance of the counter-part entity, B, there may be 0..1 related instances of entity A. An entity, A, is side many (m), if for any instance of the counter-part entity, B, there may be 0..$\infty $ related instances of entity A.

selects

belongs

Book

Id#

Title

Authors

Keywords

Category

Name

Reader

Name

Keyword table

Keyword

Has wor

Orders

All relations are many-to-many

1. Belongs ( book to category) is m-m since one book can belong to many categories and one category can have many books
2. Selects ( reader selects category) is m-m since one reader can select many categories and one category can be selected by many readers
3. Orders ( reader orders book): Reader is side 1 since one book can be assigned to at most one reader; side book many (m) since one reader can order many books
4. Has (book has keywords) is m-m since one keyword may appear in many books and one book may have many keywords

**Q6) (15 points)** What is the sequence of actions to be done if using Evolutionary generic software process model for OLS developing? What are the inputs-outputs of each of the actions?

|  |  |  |  |
| --- | --- | --- | --- |
| Sequence # | Action | Input | Output |
| 1 | Specify the list of requirements | Results of talks with the customers | List of requirements |
| 2 | Prioritize the list of requirements | List of requirements | Ordered list of requirements |
| 3 | System is empty;For each requirement R in the list of requirements do loop 3.1-3.9 |  |  |
| 3.1. | Design prototype for R, P.R | R | P.R design specification |
| 3.2. | Code P.R | P.R design specification | Code of P.R |
| 3.3. | Test P.R | Code of I.R | Test results |
| 3.4. | If test results are negative then if there are design problems goto action 3.1 else goto action 3.2 |  |  |
| 3.5.  | Integrate P.R into the System | System, P.R | System |
| 3.6. | Test System | System, requirements | Test results |
| 3.7.  | If test results are non-satisfactory, then {find the causes of failure, fix them and goto 3.6} |  |  |
| 3.8.  | Check non-functional requirements for System | System, non-functional requirements | Results of checking non-functional requirements |
| 3.9.  | If results of checking in 3.8 are non-satisfactory, then goto action 3.1, else continue loop 3 for the next R |  |  |