MASTER OF COMPUTER APPLICATIONS

(MCA)

MCA/ASSIGN/IV/YEAR/2012

ASSIGNMENTS
Year, 2012-13

(4th Semester)

(MCS-041, MCS-042, MCS-043, MCS-044, MCSL-045)
&
Problem definitions for MCS-044 July, 2012 & January, 2013

SCHOOL OF COMPUTER AND INFORMATION SCIENCES
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Course Code	**:**	**MCS-041**
Course Title	**:**	**Operating Systems**
Assignment Number	**:**	**MCA(4)/041/Assign/12**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Dates for Submission	**:**	**15th October, 2012 (For July 2012 Session)** **15th April, 2013 (For January 2013 Session)**

This assignment has four questions. Answer all questions. Each question is of 20 marks. Rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Programme Guide.

Question 1:

Consider the following jobs:

Job #	Arrival time	Run time
A	0	4
B	2	5
C	3	2
D	5	4

a) Using the **SJF** method, compute the completion times of the above jobs, average turn around time and average waiting time.

b) Using the **SRTF** (Shortest Remaining Time first) method, compute the completion times of the above jobs, the average turn around time and the average waiting time. Note that SRTF is SJF with preemption. (Hint: Completion time - arrival time = turnaround time).

c) Using the Round Robin method (with Quantum = 2), compute the completion times of the above jobs and the average waiting time. **(15 Marks)**

Question 2:

a. Explain the Banker's problem. Consider the following snapshot of a system:

	Allocation				**Max**				**Available**			
	A	**B**	**C**	**D**	**A**	**B**	**C**	**D**	**A**	**B**	**C**	**D**
P0	0	0	1	2	0	0	1	2	1	5	2	0
P1	1	0	0	0	1	7	5	0				
P2	1	3	5	4	2	3	5	6				
P3	0	6	3	2	0	6	5	2				
P4	0	0	1	4	0	6	5	6				

Answer the following questions using Banker's algorithm:

i. What is the content of the matrix need?
ii. Is the system in a safe state?
iii. If a request from P1 arrives for (0, 4, 2, 0), can the request be granted immediately? **(15 Marks)**

b. Consider the following page-reference string:
1, 2, 3, 4, 2, 1, 3, 4, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 4

How many page faults would occur for following replacement algorithms assuming one, two, three, four, five, six or seven frames? Remember that all frames are initially empty, so your first unique pages will all cost one fault each.

i. LRU replacement.
ii. FIFO replacement.
iii. Optimal replacement. **(10 Marks)**

Question 3:

a. The Linux kernel does not allow paging out kernel memory. What effect does this restriction have on kernel design? What are two advantages and two disadvantages of this design decision? **(10 Marks)**

b. The Windows 2000 VM manager uses a two-stage process to allocate memory. Identify several ways in which this approach is beneficial. **(10 Marks)**

Question 4:

a. Discuss in detail the Process management, Memory management, I/O management, File management and Security and Protection in WINDOWS 7 Operating System.

(20 Marks)

Course Code	**:**	**MCS-042**
Course Title	**:**	**Data Communication and Computer Network**
Assignment Number	**:**	**MCA (4)/042/Assign/12**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Dates for Submission	**:**	**15th October, 2012 (For July 2012 Session)** **15th April, 2013 (For January 2013 Session)**

This assignment has eight questions. Answer all questions. Rest 20 marks are for viva voce. You may use illustration and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation.

Q 1: Assume a data stream is made of "000010" Encode this stream using the following encoding schemes. **(10 marks)**

(i) Manchester
(ii) Differential Manchester
(iii) UNI polar
(iv) Polar NR Z-1
(v) RZ
Also discuss the usefulness of each scheme.

Q 2: (i) Illustrate constellation diagram of 8- PSK and 8- QAM. **(5 marks)**

(ii) Given a 10 bit sequence frame: 1001111001 and a divisor (polynomial) of 1011, Find the CRC. **(5 marks)**

Q 3: How are problems of Hidden Station and Exposed Station resolved in wireless LAN? Explain in detail. **(10 marks)**

Q 4: Explain the 3-way handshake method. How is it different from 2-way handshake method? **(10 marks)**

Q 5: How does BGP work? How does it solve the Count to Infinity problem? **(10 marks)**

Q 6: Explain Diffie Hellman algorithm-with the help of an example. **(10 marks)**

Q 7: What is the utility of digital certificate? How are these signatures created? **(10 marks)**

Q 8: Differentiate between the following: **(10 marks)**

(i) Leaky Bucket Traffic Shaper and Token bucket Traffic Shaper
(ii) Distance vector routing and Link state routing

Course Code	**:**	**MCS-043**
Course Title	**:**	**Advanced Database Management Systems**
Assignment Number	**:**	**MCA (4)/043/Assign/12**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Dates for Submission	**:**	**15th October, 2012 (For July 2012 Session)** **15th April, 2013 (For January 2013 Session)**

This assignment has ten questions, which carries 80 marks. Answer all the questions. Rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation. Answer to each part of the question should be confined to about 300 words.

Q 1: The organization called ABC undertakes several kinds of software project related to HR finance, manufacturing projects. Each employee can move on one or more projects. Each project is undertaken on the request of a client. A client can request for several projects. Each project has only one client. A project can use a number of items from different manufacturers and items may be used by several projects. Before delivery of items to a client, it is tested by testing group in the organization. **(5 marks)**

(a) Draw the EER diagram for the organization showing all entities, relationship, aggregation, generalisation and specialisation for the description given above. **(5 marks)**

(b) Create the normalised tables till 5 NF for the EER diagram created as answer to part (a) of this question, highlighting the different types of dependencies including Multi-Valued and Join dependencies (if your design does not have any such dependency, then you must explain the MVD and JD with the help of an example situation). **(5 marks)**

(c) Draw the class diagram for the organization as described above and relate it to database design as done in part (b). **(5 marks)**

Q 2: Consider the following relations: **(6 marks)**

Hotelstaff (S_code, S_name, S_desig, S_pay)
Client (C_id, C_name, C_address, C_phone, C_city)
Room (R_id, R_type, R_rent, R_booked)
Booking (B_id, C_id, R_id, S_code, B_date)

Write the appropriate SQL commands for the following:

i. Find the details of all the staff whose designation is "Dy. Manager" and who have made booking of executive type room to the client from Pune.

ii. List the details of all the rooms which have not been allocated to any client.
iii. Find the names of all the clients who are from "Goa and Delhi" for whom the booking was done in the last 15 days.

Q 3: Explain the significance and usage of views in a relational database system, with the help of suitable example. Explain any four constraints of updating a tuple in a view. **(8 marks)**

Q 4: (a) Define indices and their advantages in RDBMS. Explain the concepts of clustering and hashing indices, using an example of each. **(10 marks)**

(b) Consider the relations:

GRADE (stud_id, subject_id, grade)
SUBJECT (subject_id, s_name, teacher)

(i) Write the relational algebraic query for the following:

- List the student number, subject names and grades of the student whose id is 100.
- List the grades of all the students in the subjects taught by teacher "XYZ". **(5 marks)**

Q5: Explain the role of checkpoints in log-based recovery with the help of an example. **(5 marks)**

Q 6: Discuss the shadow paging recovery scheme. Compare this scheme with the log based recovery scheme. **(6 marks)**

Q 7: Discuss how the two-phase locking protocol ensures serial ability but does not ensure deadlock free situation. **(5 marks)**

Q 8: How does embedded SQL differ from Dynamic SQL with the help of an example describe the implementation of cursor and triggers. **(5 marks)**

Q 9: How does Postgre SQL perform storage and indexing of tables? **(5 marks)**

Q 10: How OLAP supports query processing in dataware house? **(5 marks)**

Course Code	**:**	**MCS-044**
Course Title	**:**	**Mini Project**
Assignment Number	**:**	**MCA (4)/044/Assign/12**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Dates for Submission	**:**	**15th October, 2012 (For July 2012 Session)** **15th April, 2013 (For January 2013 Session)**

There are five questions in this assignment carrying 80 marks. Rest 20 marks are for viva-voce. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Program Guide for the format of presentation. Assumptions made if any, should be stated.

Background and Project Specifications:

A University like IGNOU wants to design and implement a web-based centralised system for Synopsis submission for the Project Courses. A Synopsis is created by a student under the supervision of a Project Guide. A person can be an eligible project guide if he has a MCA or B. Tech Computer Science degree and at least two years of experience at the Industry. An eligible project guide can guide maximum of 6 students in a semester. The synopsis submission requires a student to fill the relevant synopsis information and submit it. An incomplete synopsis or the synopsis submitted by ineligible students may be rejected. Once a synopsis is duly submitted, it is evaluated. A number of synopses are evaluated by an evaluator. Synopsis may be sent to them electronically and comments for improvement, status (Approved or Not Approved) is updated by the evaluator. A bill for evaluator may automatically be generated when all the synopsis sent to him/her are evaluated. An evaluator is allotted a maximum of 50 synopses. If an evaluator does not complete the task of evaluating synopsis in two weeks time then the synopses returns to the administrator, who sends them to a different evaluator. The system needs to maintain data of valid students, their synopsis, project guides, evaluator and the evaluation status of synopsis.

You may study such manual system at your Regional Centre.

Q 1: Which Systems Development Life Cycle (SDLC) will you propose for the specification given above? Justify you selection by evaluating suitability of at least two SDLCs. **(10 Marks)**

Q 2: What would be major costs of installing the system? What are going to be the benefits in terms of finances? Perform a cost-benefit analysis for the proposed software. List the major tasks and milestones of the Project and make a project schedule. You schedule must include both GANTT and PERT charts. Explain the two charts drawn by you. **(10 Marks)**

Q 3: Study the system and create a software requirement specification. You must identify either the processes or objects while analyzing. During the analysis give consideration to possible input and output of the processes. After identifying the requirements, create Analysis Models. You may either use the classical approach and draw Entity relationship model and data flow diagrams (DFD's) up to level 2-3; or you may take object oriented analysis approach and create class diagram, use case diagram, use cases etc.

(10+15 Marks)

Q 4: Think of system architecture and then perform data design. You must perform normalization on tables up to 3rd normal form. The table design must include Primary and Foreign keys and constrains. Create the systems flow chart or detailed process design and state transition diagrams. Also design the user input screens and output report formats. **(15+10 Marks)**

Q 5: Design various unit test cases for different testing techniques/ strategies. **(10 Marks)**

Course Code	**:**	**MCSL-045**
Course Title	**:**	**UNIX and DBMS LAB**
Assignment Number	**:**	**MCA (4)/L045/Assign/12**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Dates for Submission	**:**	**31st October, 2012 (For July 2012 Session)** **30th April, 2013 (For January 2013 Session)**

The assignment has two parts A and B. Answer all the questions. Each part is for 20 marks. UNIX and DBMS lab record carries 40 Marks. Rest 20 marks are for viva voce. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the MCA Programme Guide for the format of presentation. If any assumptions made, please state them.

PART-I: MCS-041

Question 1:

Write the UNIX commands for the following:

(a) To print the calendar for the current month.
(b) To append the contents of *file2* after the contents of the *file1* and redirect them to a new *file3*.
(c) To print the first difference between any two given files.
(d) To change the command prompt from **$** to ~.
(e) To grant the permissions of **r w x** to the *user* and **execute only** permission to the *group* and *others* for all the files in a current directory.
(f) To direct a standard output to any of the line printer.
(g) To list all the files in the current directory whose file names starts with f.
(h) To execute some command even after logout.
(i) To split a file *splittest*, which is containing 20 lines into 5 lines each which are directed to four various files.
(j) To display the first 2 lines in a given file.

(5 Marks)

Question 2:

(a) Write a shell program to count no. of other symbols in a given file by the user.
(5 Marks)

(b) Write a shell script to find the difference between any two given dates.
(5 Marks)

(c) Write a shell script to display the smallest element in a given 2X2 matrix.
(5 Marks)

PART-II: MCS-043

Question 1:

(a) Create an appropriate database using Oracle for a study centre management system. (Perform Normalization till the required levels)

(10 Marks)

(b) Perform following queries using SQL:

(5 Marks)

(i) Find the name of the programmes those are been activated in the given study centre.
(ii) Find the no of students in BCA programme for the current year.
(iii) Display the corresponding Regional Centre Code if the study centre code is given.
(iv) Display the list of all the academic counsellors of MCA programme.
(v) Display the total no. of assignments received in the current session for the MCSL-045 course.

(c) Write appropriate triggers, exceptions and functions for the above study centre management system database schema and describe them briefly.

(5 marks)

MCS 044: Mini Project, Problem Definitions for July, 2012 & January, 2013

Important Notes
1. Viva-voce worth 20 Marks is compulsory for each course.
2. Please follow the MCS-044 guidelines for solving, presentation format and submission of the Mini Project.

INTRODUCTION

The mini project is designed to help you develop practical ability and knowledge about practical tools/techniques in order to solve real life problems related to the industry, academic institutions and computer science research. The course Mini Project is one that involves practical work for understanding and solving problems in the field of computing. In this booklet the list of the problem definitions for the July, 2012 and Jan, 2013 sessions are given. **Every year, the list of problem definitions will change. Please do not attempt the problems given in the booklet (MCS-044, Block-1) received by you along with your course material.**

PROBLEM DEFINITIONS

We have divided different projects into four broad areas / categories of computer science as given below, so that you can select any one of these categories for your Mini project.

- Application development
- Networking project
- System software
- Website development.

An initial list of project definition will be given below in the following sections. However, student can elaborate the project definitions after discussing it with the project counsellor.

Students should **select one project from the given categories only** as per their interest, experience and knowledge in that area. Students should evaluate themselves and then should choose the project. Students may propose modifications/suggestions in the given project specification and finalize it in consultation with the MCS-044 counsellor.

APPLICATION DEVELOPMENT PROJECTS

Here we focus on investigating new ideas in application development through different projects. A set of possible project name and their details will be presented, however, students are encouraged to be creative and develop their own ideas in the given project descriptions.

1) Project Name: Cricket Tournament Management System

Description

Assume that you are required to manage the scores and player performances in a Cricket Tournament. The tournament is played on the round robin league with a total of four or more teams. Each team submits a list of 16 players at the start of the tournament. A team cannot change the player's list once they have submitted it. Each team plays only one match with each of the other teams. The system keeps track of all the matches and the individual performances in batting as well as bowling. A points table is maintained to keep track of the round robin league toppers. For every win a team is given 4 points, 2 for a draw and 0 for a loss. The league toppers are decided on the basis on highest points else on the run rate of the team (if the points are equal). The system keeps tracks of final 11 players and the contribution of these players in the match along with the win/loss records. Top two teams qualify for the final match, and top performer is selected as the Man of Tournament. (Create your own logic for the Man of Tournament). Create a Tournament Management System that keeps track of the matches, date of play, detailed win/loss record of teams, point's table, the batting and bowling performances of individuals etc. Make and state suitable assumptions, if any.

2) Project Name: Digital Project Assistant

Description

A digital project assistant is expected to keep track of the following for project leader's and CEO's:

- A schedule of meetings with venue, date, time and agenda. The software should generate a suitable reminder prior to the meeting giving sufficient time to the person to be able to attend the meeting.
- Keeping track of tasks that are to be completed on a given day.
- Keeping track of ongoing projects and their deadlines. The meetings related to projects may also be fixed from time-to-time with the team leaders.

Design and develop software that creates the activity chart for the project teams for a week. The software also monitors the weekly targets of the individuals.

NETWORKING PROJECTS

We will focus on investigating new ideas in networking research through different networking projects. A set of possible project topics which will be presented, however, students are encouraged to be creative and develop their own ideas in the given project descriptions.

1) Project Name: Performance and Security Evaluation of Wireless Network

Description

This project is aimed at helping you demonstrate the performance parameters of a wireless network, preferably for a local area wireless network. Your project must address the performance parameters for a Wireless Access Point. The Wireless Access point plays a major role in adding or removing a node from a wireless network. Check at what level of efficiency such points are operating. Also evaluate the kind of security that is being used by the network at various levels.

2) Project Name: Search Engine for Computer Networking Resources

Description

Networking Resource search engine should provide efficient storage, retrieval and management of key Networking resource web pages. It should allow a user to search for information on the basis of some key networking terms. The database of networking resources should be generated based on some ranking mechanism. The database should include the resource name, the key term associated with it, description and feedback on the quality of the products.

SYSTEM SOFTWARE DEVELOPMENT PROJECTS

Here we will focus on investigating new ideas in application development through different projects. A set of possible projects and their details will be presented however, students, are encouraged to be creative and develop their own ideas in the given project descriptions.

1) Project Name: Backup File Manager

Description

The purpose of this system software is to develop a Linux OR Windows based file management system that stores the last two saved versions of a file under the same name. It may use special area (may be on a different disk) to store the backup file. Any save operation on the system should invoke this utility software. The backup file may be stored as a compressed file. The backup file need not be displayed in the folder unless a user is specifically requesting to see the file. Any operation on the backup file should generate a warning.

2) Project Name: Access Right Management for Directories

Description

This software utility is expected to support UNIX like access rights for all the folders on a disk. Each folder will be provided with three types of users – Owner, Friends and Others. Each of these types may have access rights for Read, Write and Execute on the folder and all the files in the folder. The Write and Execute access must be maintained through a password validation of the users. Each user may be given different password for such verification.

WEB DEVELOPMENT PROJECTS

Here, we will focus on investigating new ideas in application development through different projects. A set of possible project name and their details will be presented, however, students are encouraged to be creative and develop their own ideas in the given project descriptions.

1) Project Name: Online Admission System

Description

Develop an Online admission system that provides all the facilities related to admission of a student at a University like IGNOU. You must consider the *admission form* of IGNOU for design of such a system. The system must have facilities for online submitting of documents that are required for admission and, if possible, a secure online payment gateway. There should be different types of users of the system – students who register for a programme or re-register for a semester, regional functionaries who approve the admission and allots enrolment number and study centre to the student and a master system administrator who has control on all the user accounts. The admission is provided after checking eligibility, fee and checking online documents. A user name and password is given to each registered student. A student can make requests for change of address, change of study centre etc using this user name and password.

2) **Project Name: Online Book Order processing System**

Description

Develop an online book order processing system for a publisher. Publisher has many online corporate customers who are given proper access rights to place an order for books. After placing the order is assembled after collecting books from various divisions, this collection process is monitored by an employee. Once the employee checks and verifies that the order has been assembled properly, an invoice is generated for the customer. The invoice is issued to the customer and a bill is generated for the same. The order is shipped to the customer once invoice is accepted by the customer. The payment of the order is also monitored by a finance person. The customer can check the status of its order online and query about the delay, if any.