



**Sir Syed University of Engineering & Technology
Faculty of Computing and Applied Sciences**

Department of Computer Science & Information Technology

Mid Term Examinations (Spring 2022)

Course Code with Title	CS-222T: Introduction to Operating System	Program	Bachelor of Computer Science (BSCS)
Instructor	Dr. Ahmed Bilal / Adeel Saeed	Semester	4 th
Start date & Time	May 19, 2022 at 09:30 AM	End Time	11:00AM
Maximum Marks	30		

IMPORTANT INSTRUCTION:

Read the following Instruction carefully:

- Attempt All Questions.

Q.1.

(05)

The services and functions provided by an operating system can be divided into two main categories. Briefly describe the two categories, and discuss how they differ.

Q.2.

(05)

Briefly explain Dual-mode Operation. How does the distinction between kernel mode and user mode function as a rudimentary form of protection (security) system?

Q.3.

(05)

Describe different types of schedulers in operating system. Which scheduler controls degree of multiprogramming? How does system get good throughput.

program counter / stack / id / register.

Q.4.

(05)

What resources are used when a thread is created? How do they differ from those used when a process is created? Provide three examples in which multithreading provides better performance than a single-threaded solution.



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Q.5.

(05)

Consider the following set of four processes. Their arrival time and burst time are given in following table.

Process	Arrival Time	Burst Time
P0	0	10
P1	1	6
P2	3	2
P3	5	4

Calculate average turnaround time and average waiting time using first come first serve (FCFS) and shortest job first (SJF-Non Preemptive and Preemptive both) scheduling algorithms.

Q.6.

(05)

Consider 5 processes P0, P1, P2, P3, P4 and 4 types of resources. At T0 we have the following system state:

Max Instances of Resource Type A = 3

Max Instances of Resource Type B = 17

Max Instances of Resource Type C = 16

Max Instances of Resource Type D = 12

	Allocation Matrix (No of the allocated resources By a process)				Max Matrix Max resources that may be used by a process			
	A	B	C	D	A	B	C	D
P0	0	1	1	0	0	2	1	0
P1	1	2	3	1	1	6	5	2
P2	1	3	6	5	2	3	6	6
P3	0	6	3	2	0	6	5	2
P4	0	0	1	4	0	6	5	6
Total	2	12	14	12				

i) Create the Available Matrix and Need Matrix.

ii) Use the Banker's algorithm to test if the system is in a safe state or not? If system is in safe state, give safe sequence.



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Mid Term Examinations (Spring 2022)

Course Code with Title	CS-224: Theory of Automata & Formal Languages	Program	BS(CS)
Instructor	Dr. Abdul Hameed Pitafi Mr. Rajkumar Chawla	Semester	4 th
Start date & Time	May 16, 2022 at 09:30 AM	End Time	May 16, 2022 11:00AM
Maximum Marks	30		

IMPORTANT INSTRUCTIONS:

Read the following Instructions carefully:

- Attempt All Questions.
- Use of Calculator is not allowed.
- Write your answers in ink. For drawings pencils may be used.

Q.1. Write the Regular Expression for the following languages? (06)

- All words whose length is completely divisible by 3 are valid. $\Sigma = \{a,b\}$
- All words that contain odd numbers of c's are valid. $\Sigma = \{a,b,c\}$
- Students roll# with format Roll-Program-Batch is valid. $\Sigma = \{CS,IT,0...9,-\}$
{Batches 2017, 2018, 2019, 2020S, 2020F, 2021S, 2021F, 2022, Program CS, IT, SE and Roll no from 001 to 300 are valid.}

Q.2. Write Regular Expression and draw deterministic finite automata for the following languages. $\Sigma = \{a,b\}$ (06)

- All words those start with bab and ends with aba are valid.
- All words that contains exact three b's are valid.



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Q.3

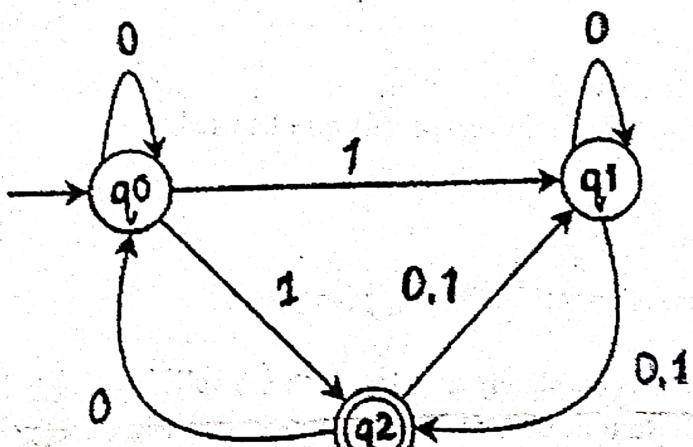
(06)

Write the Regular Expression, draw the Non-deterministic Finite Automata and convert into deterministic finite automata for the language that contains at least three characters with same symbol in start and end. $\Sigma = \{0,1\}$

Q.4

(06)

Draw an equivalent DFA for the given NFA?



Q.5

(06)

Draw a Moore Machine that count the occurrence of pattern 010 and 101 in the user given string?



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Mid Term Examinations (Spring 2022)

Course Code with Title	CS-229 : DATABASE SYSTEMS	Program	BS(CS)
Instructor	Asif Raza	Semester	4 th
Start date & Time	May 20, 2022 at 09:30 AM	End Time	11:00AM
Maximum Marks	30		

IMPORTANT INSTRUCTIONS:

Read the following Instructions carefully:

Attempt all 05 questions. All questions carry equal marks.

Q.1. (06)

How many levels database schema can be categorized? Illustrate all of them with the help of suitable architecture. Also draw a relevant diagram.

Q.2. (06)

Draw an ERD by considering the following scenario:

Company organized into DEPARTMENT. Each department has unique name and a particular employee who manages the department. Start date for the manager is recorded. Department may have several locations.

- A department controls a number of PROJECT. Projects have a unique name, number and a single location.
- Company's EMPLOYEE name, ssno, address, salary, gender and birth date are recorded. An employee is assigned to one department, but may work for several projects (not necessarily controlled by her dept). Number of hours/week an employee works on each project is recorded. The immediate supervisor for the employee.
- Employee's DEPENDENT are tracked for health insurance purposes (dependent name, birthdate, relationship to employee).

Q.3. (06)

Enhanced ERD, Specialization and Generalization:

Assume the BANKER schema and suppose that it is necessary to keep track of different types of ACCOUNTS (SAVINGS_ACCTS, CHECKING_ACCTS) and LOANS (CAR_LOANS, HOME_LOANS). Suppose that it is also desirable to keep track of each ACCOUNT's TRANSACTIONS (deposits, withdrawals, checks) and each LOAN's PAYMENTS; both of these include the amount, date and time. Modify the BANK schema, using ERD and EERD concepts of specialization and generalization. State any assumptions you make about the additional requirements.



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Q4. (06) Write SQL commands of the following questions by using the schema mentioned below.

- (a) Retrieve the name and address of all employees who work for the "Research" department.
- (b) For Every project located in "Stafford", list the project number, the controlling department number, and the department manager's last name, address and birth date.

Q5. (06) Write SQL commands of the following questions by using the schema mentioned below

- (a) Retrieve the birth date and address of the employee(s) whose name is "John B. Smith".
- (b) Make a list of all project numbers for project that involve an employee whose last name is "Smith", either as a worker or as a manager of the department that controls the project.

EMPLOYEE

Fname	Minit	Lname	SSN	Bdate	Address	Sex	Salary	Super_ssn	Dno
John	B	Smith	123456789	1965-01-09	731 Fondren, Houston, TX	M	30000	333445555	5
Franklin	T	Wong	333445555	1955-12-08	638 Voas, Houston, TX	M	40000	888665555	5
Alice	J	Zelaya	888887777	1968-01-19	8321 Castle, Spring, TX	F	25000	987654321	4
Jennifer	S	Wallace	987854321	1941-06-20	291 Berry, Bellaire, TX	F	43000	888665555	4
Ramesh	K	Nerayan	666884444	1982-09-15	875 Fir Oak, Humble, TX	M	38000	333445555	5
Joyce	A	English	453453453	1972-07-31	5631 Rice, Houston, TX	F	25000	333445555	5
Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas, Houston, TX	M	25000	987654321	4
James	E	Borg	888665555	1937-11-10	450 Stone, Houston, TX	M	65000	NULL	1

DEPARTMENT

Dname	Dnumber	Mgr_ssn	Mgr_start_date
Research	5	333445555	1988-05-22
Administration	4	987654321	1995-01-01
Headquarters	1	888665555	1981-08-19

DEPT_LOCATIONS

Dnumber	Location
1	Houston
4	Stafford
5	Bellaire
5	Sugarland
5	Houston

WORKS_ON

SSN	Pno	Hours
123456789	1	32.5
123456789	2	7.5
666884444	3	40.0
453453453	1	20.0
453453453	2	20.0
333445555	2	10.0
333445555	3	10.0
333445555	10	10.0
333445555	20	10.0
999887777	30	30.0
999887777	10	10.0
987987987	10	35.0
987987987	30	5.0
987854321	30	20.0
987854321	20	15.0
888665555	20	NULL

PROJECT

Pname	Pnumber	Plocation	Dnum
ProductX	1	Bellaire	5
ProductY	2	Sugarland	5
ProductZ	3	Houston	5
Computerization	10	Stafford	4
Reorganization	20	Houston	1
Newbenefits	30	Stafford	4

DEPENDENT

SSN	Dependent_name	Sex	Bdate	Relationship
333445555	Alice	F	1986-04-05	Daughter
333445555	Theodore	M	1983-10-25	Son
333445555	Joy	F	1958-05-03	Spouse
987854321	Abner	M	1942-02-28	Spouse
123456789	Michael	M	1988-01-04	Son
123456789	Alice	F	1988-12-30	Daughter
123456789	Elizabeth	F	1987-05-05	Spouse

-----THE END-----

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Mid Term Examinations (Spring 2022)

Course Code with Title	CS-226: Introduction to Software Engineering	Program	BS(CS)
Instructor	Ms. Sabeen Fatima Ms. Jawaria Hafeez	Semester	4 th
Start date & Time	May 18, 2022 at 09:30 AM	End Time	11:00AM
Maximum Marks	30		

IMPORTANT INSTRUCTIONS:

Read the following Instructions carefully:

- Attempt All Questions.

QUESTION NO. 1

(10 Marks)

Design Product backlog and Sprint Backlog for the given project. You are free to assume details like team size and availability.

This charity management system will help NGOs to find donors easily. This system has three modules namely, Admin, NGO and Donor. Admin can login using credentials and manage the request raised by NGO by approving or rejecting it. Approval will be done after verifying the NGO documents uploaded by NGO. Admin will get the report of NGOs who get donations. NGOs can register and raise request by uploading NGO documents. Once admin gets the approval, they can login using credentials. NGO can raise request in need to the various registered donor. They can view the previous events list and donation report. Donor can simply register and login using credentials. They will get the notification of the request raised by NGOs for donation. They need to fill the details regarding donation on approval of request. Donor will get the date of donation. They can also view donation history.

QUESTION NO. 2

(10 Marks)

Suggest the most suitable process model for the following and also give justification for your choice.

1. Clients wants a clone of Daraz.com but have to launch it with basic requirements in three months and other components can be added later after initial release.
2. Client is technically very sound but has very vague requirements due to the novelty of the project. Project involves human computer interaction.

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QUESTION NO. 3

(10 Marks)

Message Master is an application that would allow users to check all their messages in one application. Instead of going to WhatsApp, Facebook, Twitter, iMessage, Viber or Skype they would just use one platform. This app would save time and clicks, something every person with a smart phone appreciates.

Write user requirements and system requirements for the above application.

*****Education is improving the Lives of others! *****



Sir Syed University of Engineering & Technology
Faculty of Computing and Applied Sciences (For CS, SE, IT, BI, MA)

Department of Computer Science & IT

Mid Term Examinations (Spring 2022)

Course Code with Title	MS-208: Multivariate Calculus	Program	BSCS
Instructor	S.M.Aurangzeb	Semester	4 th
Start date & Time	May 17, 2022 at 09:30 AM	End Time	11:00AM
Maximum Marks	30		

IMPORTANT INSTRUCTIONS:

Read the following Instructions carefully:

- Attempt All Questions.
- Use of Calculator is allowed

Q.1.

(10) /○

(a) Graph the function .

$$f(x) = \begin{cases} 1 - x^2 & ; \quad x \in (-\infty, +\infty) \\ 1 + x & ; \quad x \in (1, 6) \\ 0 & ; \quad x = 1 \end{cases}$$

(b) Graph the function and also shift it

$$x^2 - y = 1 , \quad \text{Up 1 unit and right 3 unit}$$

Q.2.

(10) 5

(a) Find local extrema of the function $f(x,y) = x^3 + y^3 + 4xy$

(b) Find dy/dx of $y^2 \cos^{-1} y = x^2 + y^2$

Q.3.

(10)

(a) Solve the following limit

$$\lim_{x \rightarrow 0^+} (\tan(x-a))/(x^{1/2} - (a)^{1/2})$$

$$\lim_{x \rightarrow 0^+} \frac{(\sqrt{x^2 + 1} + x)^2}{(x^2 + 1)^{1/3}}$$

(b) Find $\frac{\partial w}{\partial t}$

$$w = 2ye^x - \ln z \quad \text{where } x = \ln(t^2 - 1), \quad y = \tan^{-1}t, \quad z = \frac{1}{\sqrt{1-t^2}}$$

(c) find the value of c by using mean value theorem .

$$f(x) = x^2 + 2x - 1, \quad [0, 1]$$