(e) Given the following information -

Process	Arrival Time (ms)	Burst Time (ms)	Priority (ms)
P-1	0	14	3
P-2	1	16	5
P-3	2	12	2
P-4	3	25	4
P-5	4	23	1

Compute average waiting time and average turnaround time by using preemptive SJF scheduling algorithm, FCFS scheduling and Round Robin (time quantum = 5) scheduling.

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3.1

DDCE - MCA 3rd / MCA (LE) - 1st Semester /
M.Sc. - (IT/ITM/CS) - CS - 3.1 - (OS) - R & B

2017

Full Marks - 70

Time : As in the Programme

The figure in the right hand margin indicate marks.

Answer ALL questions.

1. Answer all the questions. [2×5

(a) What is system calls ?

(b) Write the advantages of multiprogramming ?

(c) What is Process Control Block (PCB) ? List the different information stored in a PCB.

(d) What is Belady's anomaly ?

(e) What is Counting Semaphore ?

[Cont...

2. Answer any THREE : [8×3

(a) Write the differences between Batch processing system and Real Time Processing System ?

(b) Write the differences between paging and segmentation ?

(c) Explain semaphores and write a short note on it.

(d) What is a Virtual Machine ? How it is implemented ? Explain with an example.

(e) Write the difference between Internal and External Fragmentations.

3. Answer any THREE : [12×3

(a)(i) Explain the various process states and their meaning.

(ii) Discuss in briefly about the basic concept of Demand paging.

(b) Solve the following questions using Banker's algorithm by considering the snapshot of a system given below.

[Cont...

(1) What is the content of the matrix Need ?

(2) Is the system is in Safe State ?

(3) If a request from processes P5 arrives for (1,2,0,0) can the request be granted immediately. Show the new system state.

System Snapshot :

Process	MAX				ALLOCATION				AVAILABLE			
	A	B	C	D	A	B	C	D	A	B	C	D
P1	0	0	1	2	4	0	0	1	3	2	1	1
P2	1	7	5	0	1	1	0	0				
P3	2	3	5	6	1	2	5	4				
P4	1	6	5	3	0	6	3	3				
P5	1	6	5	6	0	2	1	2				

(c) Explain the different types of directory structure with necessary diagram.

(d) A small computer has 3 page frames. A process makes the following list of page references : 1, 2, 3, 4, 1, 5, 2, 3, 1, 2, 5, 4, 1. How many page faults occur using FIFO, Optimal and LRU page replacement algorithms ?

[Cont...

Datawords	Codewords
00	000
01	011
10	101
11	110

(ii) What is hamming distance ? Explain simple parity check code C (5, 4) with DMIN = 2. How many bits can be corrected ? [6

(d)(i) Explain the different layers of Bluetooth. [6

(ii) Bring out the difference between repeaters, bridges, routers and Gateways ? [6

(e) Write short notes on (any TWO) : [6×2

(i) Gigabit Ethernet

(ii) Wireless LANs

(iii) Frame Relay

(iv) ATM LANs

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DDCE - MCA 3rd / MCA (LE) - 1st Semester / M.Sc. - (IT/ITM/CS) - CS - 3.2 - (DC&CN) - R&B

2017

Full Marks - 70

Time : As in the Programme

The figure in the right hand margin indicate marks.

Answer ALL questions.

1. Answer all questions. [2×5

(a) A 10 KHz baseband channel is used by a digital transmission system. Ideal pulses are sent at the Nyquist rate and pulses take 16 levels. What is the data rate ?

(b) We need to use the synchronous TDM and combine 25 digital sources, each of 100 kbps. Each output slot carries 1 bit from each digital source, but extra bit is added for synchronization. Answer the following questions :

(i) What is the size of the output frame in bits ?

(ii) What is the output frame rate ?

[Cont...

(iii) What is the duration of an output frame rate ?

(iv) What is the output data rate ?

(c) A file contains 3 million bytes. How long does it take to download. This file using a 100 kbps channel ?

(d) Define Linear blocking code ?

(e) Define Cellular telephony ?

2. Answer any THREE : [8×3

(a) What is Protocol ? Briefly describe about TCP/IP protocol suit with their functions.

(b) Explain transmission impairment and analyze different factors that cause transmission impairment.

(c) What is guided media and unguided media ? Describe different types of guided media and unguided media.

(d) Define block coding and clearly explain how error is detected and corrected using block coding technique.

[Cont...

(e) Briefly explain the SONET Layers and SONET frames.

3. Answer any THREE : [12×3

(a)(i) Define data communication with its various components. Analyze different type of data representation. [6

(ii) Discuss briefly about the term physical topology and explain different types of topology in a network. [6

(b)(i) What is spread spectrum ? Describe different types of spectrum. [6

(ii) What do you mean by fiber optic communication ? Explain the structure of fiber optic cable along with its type. Also mention advantages and disadvantages of fiber optic communication. [6

(c)(i) Define hamming distance. Find the hamming distance of the coding scheme. [6

[Cont...

DDCE - MCA 3rd / MCA (LE) - 1st Semester /
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2017

Full Marks - 70

Time : As in the Programme

The figure in the right hand margin indicate marks.

Answer ALL questions.

1. Answer all questions. [2×5=10

(a) What is MU0 processor ?

(b) Define CPSR.

(c) What do you mean by exception ?

(d) What is abstration of ARM processor ?

(e) What do you mean by thumb break-point instruction ?

[Cont...

2. Answer any THREE : [8×3=24

(a) Explain different types of memory addressability of ARM processor ?

(b) Discuss 3-stage and 5-stage pipeline organization of ARM processor.

(c) Define interrupt ? How software interrupt is implemented by ARM processor ?

(d) Explain the architectural supports provided by ARM processor for high level language implementation ?

(e) Define thumb branch instruction ? Explain different types of Thumb branch instructions with their binary encodings ?

3. Answer any THREE : [12×3=36

(a) With a neat and labeled diagram, explain register structure of ARM processor ?

(b) Write an assembly language program for ARM processor :

[Cont...

(i) to find the sum of first ten odd numbers.

(ii) to find the largest number among three numbers.

(c) Define instruction ? Explain the instruction set of ARM processor along with instruction formats with an example.

(d) What is a normalized floating-point number ? How floating-point operations are performed by ARM processor ? Explain FPA10 Organization ?

(e) Define Thumb mode ? Explain the Thumb programmer's model with a suitable diagram ?

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DDCE - MCA 3rd / MCA (LE) - 1st Semester /
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2017

Full Marks - 70

Time : As in the Programme

The figures in the right hand margin indicate marks.

Answer ALL questions.

1. Answer all questions. [2×5=10

(a) A processor accesses cache memory 86 times and finds data 43 times. Calculate hit rate ?

(b) Define superscalar processor and give one example ?

(c) Differentiate PC from μPC ?

(d) What do you mean by vector computation ?

(e) Elaborate SMT ?

[Cont...

2. Answer any THREE : [8×3=24

(a) With a suitable diagram, explain processor organization as well as register organization ?

(b) What is RISC pipeline ? Discuss different types of RISC pipelines by giving suitable examples ?

(c) Explain the Program execution in terms of micro-operations with a suitable diagram and write micro-operations for fetch cycle ?

(d) Explain Flynn's classification of computer systems with suitable diagrams and examples ?

(e) What do you mean by multicore computer ? Discuss hardware and software performance issues ?

3. Answer any THREE : [12×3=36

(a) What do you mean by cache memory ? Briefly discuss its characteristics. Explain the design elements of cache memeory ?

(b) Define and explain the characteristics of Reduced Instruction Set Architecture ?

[Cont...

(c) What is a micro programmed control unit ? Explain it with a suitable diagram ? How it differes from hardwired control unit?

(d) What do you mean by cache coherence problem ? Discuss different types of solution to cache coherence problem.

(e) Define multicore organization ? Discuss different types of multicore organizations with suitable diagrams and give examples ?

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(i) Find the customers who have a loan amount between Rs. 1,000 to Rs. 5,000.

(ii) Select the name of the patients whose weight more than 60 and age between 20-30.

(iii) Select the name of the customers who live in the same city as John live in.

(iv) List the employees who are working in coding department with more than 10 years of experience.

(v) Select the students who have attended more than 90 percentage classes in database system and belongs to MCA department.

(vi) Select the faculties who take classes either in MCA or IMCA or both in Utkal University.

(d) Briefly explain 4NF and 5NF with a suitable example.

(e) What is the requirement of the UML diagram ? Discuss different UML diagrams with suitable examples. List their advantages and disadvantages.

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2017

Full Marks - 70

Time : As in the Programme

The figure in the right hand margin indicate marks.

Answer ALL questions.

1. Answer all questions. [2×5=10

(a) What is de-normalization ? Explain with an example.

(b) List the advantages of database administrator.

(c) What is SQL ? Write the query to input data dynamically into a table.

(d) List the disadvantages of database system.

(e) What is attribute ? Discuss different types of attributes used in database system.

2. Answer any THREE : [8×3=24

(a) Construct an E-R diagram for the registrar's office. Document all assumptions you make about the mapping constraints. Assumptions :

[Cont...

- A class meets only at one particular place and time. This diagram does not attempt to model a class meeting at different places or at different times.
- There is no guarantee that the database does not have two classes meeting at the same place and time.
- (i) Each class has a unique instructor, (ii) Construct appropriate tables for the ER Diagram.

(b) What is the need of using database system ? Justify your answer with suitable examples.

(c) Discuss various keys used in Database system and list their advantages and disadvantages.

(d) What is transaction ? Differentiate between serial transaction and parallel transation with a suitable example.

(e) Draw the activity diagram of Railway reservation system.

3. Answer any THREE : [12×3=36

(a) For the following given database, write SQL queries :

person (driver_id #, name, address)

car (license, model, year)

[Cont...

accident (reporCno, date, location)

owns (driver_id #, license)

participated (drivecid, car, report_number, damage_amount)

(i) Find the total number of people who owned cars in 26th January 2017.

(ii) Find the number of accidents in which the cars belonging to "Smart Travelling" were involved.

(iii) Update the damage amount for car with licence number "XYZ 420" in the accident with report number "COMP007" to Rs. 5,000.

(b) Explain following relational algebra with suitable example :

(i) Natural Join

(ii) Set Differences

(iii) Combination of selection and projection

(iv) Rename

(c) Write the relational algebra and SQL for the given query.

[Cont...

(ii) Construct a Deterministic Push Down Machine for the language L.

$$L = \{0^n 1^n \mid n \geq 1\}$$

(d)(i) Find a solution of the given instance of the Post Correspondence Problem.

	A	B
1	1	111
2	10111	10
3	10	0

(ii) Show that the ambiguity of a Context Free Grammar is undecidable.

(e)(i) Prove that language L is not Context Free Language.

$$L = \{xx \mid x \in (0+1)^*\}$$

(ii) Write a Context Free Grammar for the language L.

$$L = \{0^n 1^{2n} \cup 0^{2n} 1^n \mid n \geq 1\}$$

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2017

Full Marks - 70

Time : As in the Programme

The figures in the right hand margin indicate marks.

Answer ALL questions.

1. Answer all the questions. [2×5

(a) How many total numbers of production to be used to derive the string $a^n b^n c^n$ by a Context Senstive Grammar.

$S \rightarrow aSBc$

$S \rightarrow abc$

$cB \rightarrow Bc$

$bB \rightarrow bb$

(b) The Context Free Grammar is ambiguous show two different parse tree of the string $a^2b^2c^2$.

$S \rightarrow A \mid B$

$A \rightarrow XY$ $\quad$ $B \rightarrow MN$

$X \rightarrow aXb \mid e$ $\quad$ $M \rightarrow aM \mid e$

$Y \rightarrow cY \mid e$ $\quad$ $N \rightarrow bNc \mid e$

[Cont...

(c) Construct a Nondeterministic Finite State Machine for the regular expression $(\underline{0}+\underline{1})^*$.

(d) At least how many states required accepting the language by a deterministics Finite State Machine ?

$L = \{x \in (0+1)^* \mid$ the third symbol is 1 from its right end$\}$

(e) How many derivation steps to derive the string w of length $n \geq 1$ from the given Context Free Grammar in Chomsky Normal Form.

2. Answer any THREE questions. [8×3

(a) Construct a Nondeterministic Finite State Machine for the language L and a Deterministic Finite State Machine to accept the complement of L.

$L = \{x \in \{0, 1\} \mid x$ contains the substring 11$\}$

(b) Prove that the language L is not regular

$L = \{x \in (0+1)^* \mid x$ has equal number of 0's and 1's$\}$

(c) Prove that the language L is not Context Free Language.

$$L = \left\{a^n b^n c^n \mid n \geq 0\right\}$$

[Cont...

(d) Construct a Nondeterministic Push Down Machine for the language L.

$$L = \left\{a^i b^j c^k \mid \text{either } i = j \text{ or } j = k \text{ where } i, j, k \geq 1\right\}$$

(e) Construct a Turing Machine for the language L.

$$L = \left\{0^n 1^n 0^n \mid n \geq 1\right\}$$

3. Answer any THREE questions. [12×3

(a)(i) Construct a Nondeterministic Finite State Machine for the regular expression $\left(\underline{0}+\underline{1}^*\right)\underline{1}\,\underline{1}\left(\underline{0}^*+\underline{1}\right)$.

(ii) Construct a Deterministic Finite State Machine for the language L and wirte its regular grammar.

$L = \{x \in (0+1)^* \mid x$ is divisible by 4$\}$.

(b)(i) Construct a NFSM for the language L and then convert into DFSM. $L = \{x \in (0+1)^* \mid$ in x the 2nd symbol is 1 from its right end$\}$.

(ii) Prove that the language L is not regular.

$L = \{0^n \mid n$ is perfect square$\}$

(c)(i) Convert the given Context Free Grammar into Chomnsky Normal Form.

$S \rightarrow bA \mid aB$

$A \rightarrow bAA \mid aS \mid a$

$B \rightarrow aBB \mid bS \mid b$

[Cont...