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5E1351

Roll No. _____ Total No. of Pages: 4

5E1351

B. Tech. V - Sem. (Main / Back) Exam., March - 2022

ESC Computer Science & Engineering

5CS3 – 01 Information Theory & Coding

Time: 2 Hours **Maximum Marks: 80**

Min. Passing Marks: 28

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[5×2=10]**

All questions are compulsory

Q.1 Prove the following statement, "if the receiver knows the message being transmitted, the amount of information carried is zero."

Q.2 State the Shannon's first theorem for source coding.

Q.3 What is the value of syndrome vector for error free transmission?

Q.4 Define the basic properties Galois fields.

Q.5 What do you mean by surviving path of Viterbi decoding?

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PART – B

(Analytical/Problem solving questions) **[4×10=40]**

Attempt any four questions

Q.1 Prove that the upper boundary on entropy is given as $H_{Max} \leq \log_2 M$ here 'M' is the number of message emitted by the source.

Q.2 Channel capacity is given by –

$$C = B \log_2 \left(1 + \frac{S}{N}\right) \text{ bits/sec}$$

In the above equation when the signal power is fixed and white Gaussian noise is present, the channel capacity approaches an upper limit with increase in bandwidth 'B'. Prove that this upper limit is given as -

$$C_\infty = \lim_{B \to \infty} C = 1.44 \frac{S}{NO} = \frac{1}{In^2} \frac{S}{NO}$$

Q.3 For a systematic ∠BC, the three parity check digits C_4, C_5 and C_6 are given by-

$C_4 = D_1 + D_2 + D_3$

$C_5 = D_1 + D_2$

$C_6 = D_1 + D_3$

(i) Construct generator matrix

(ii) Construct code generated by this matrix

Determine error correcting capability.

Q.4 The generator polynomial of a(7, 4) cyclic code is G(p) = p3 + p + 1. Find all the code vectors and generator matrix for the code systematic form of cyclic code.

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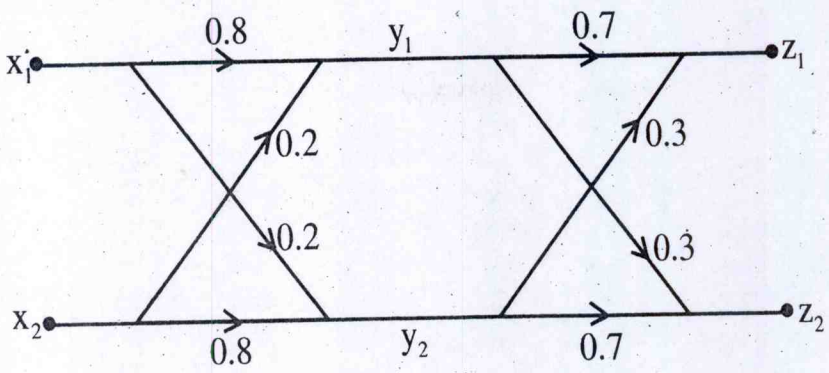
Q.5 Explain the Viterbi decoding or maximum likelihood decoding with an example.

Q.6 The BSC are connected in cascade as shown in fig -



- Determine the transition matrix for discrete memory less channel.
- Determine $P(z_1)$ and $P(z_2)$ if $p(x_1) = 0.6$ and $p(x_2) = 0.4$.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[2×15=30]**

Attempt any two questions

Q.1 For a discrete memory less source 'x' with six symbols x_1, x_2.....x_6. Find a compact code for every symbol if the probability distribution is as follows -

$P(x_1) = 0.3$ $P(x_2) = 0.25$ $P(x_3) = 0.2$

$P(x_4) = 0.12$ $P(x_5) = 0.08$ $P(x_6) = 0.05$

Q.2 For a systematic linear block encoder, the generator matrix is given by -

$$\left[\begin{array}{cccc:ccc} 1 & 0 & 0 & 0 & 1 & 1 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 & 1 & 1 \end{array}\right]$$

- Decode the received words 101100 and if it is incorrect then recover correct code word.

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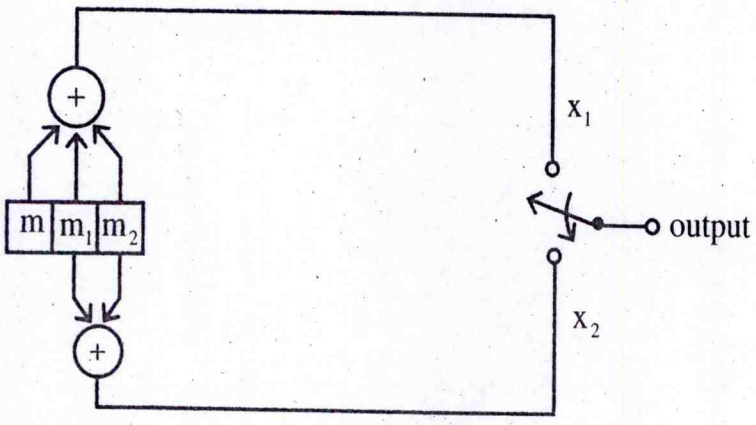
Q.3 For the convolution encoder with constraint length of 3 and rate $\frac{1}{2}$ as shown below -



Find out -

(i) Code rate (1)

(ii) Dimension of encoder (1)

(iii) Constraint length (1)

(iv) Generating sequence (1)

(v) Output sequence for message sequence of m = (10011)

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Roll No. _____ Total No. of Pages: 3

5E1399

B. Tech. V - Sem. (Main / Back) Exam., March - 2022

ESC Information Technology

5IT3 – 01 Microprocessor and Interfaces

Time: 2 Hours **Maximum Marks: 80**

Min. Passing Marks: 28

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[5×2=10]**

All questions are compulsory

Q.1 What is the function of flag register?

Q.2 What is the function of control bus?

Q.3 What is the function of 'READY' signal?

Q.4 Define 'Instruction Cycle'.

Q.5 Give classification of 8085 interrupts.

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PART – B

(Analytical/Problem solving questions) **[4×10=40]**

Attempt any four questions

Q.1 Specify the register contents and the flag status as the following instructions are executed -

A	C	S	Z	CY	
XX	XX	0	0	0	- intial contents

MVI A, 5EH

ADI A2H

MOV C, A

HLT

Q.2 Give classification of 8085 addressing modes with two examples of each.

Q.3 Write instructions to perform the following -

(i) Load 59 H in memory location 2040 H and increment the contents of memory location.

(ii) Load 90 H in memory location 2041 H and decrement the contents of memory location.

Q.4 Define the peripheral mapped I/O and memory-mapped I/O techniques of interfacing I/O devices and compare them.

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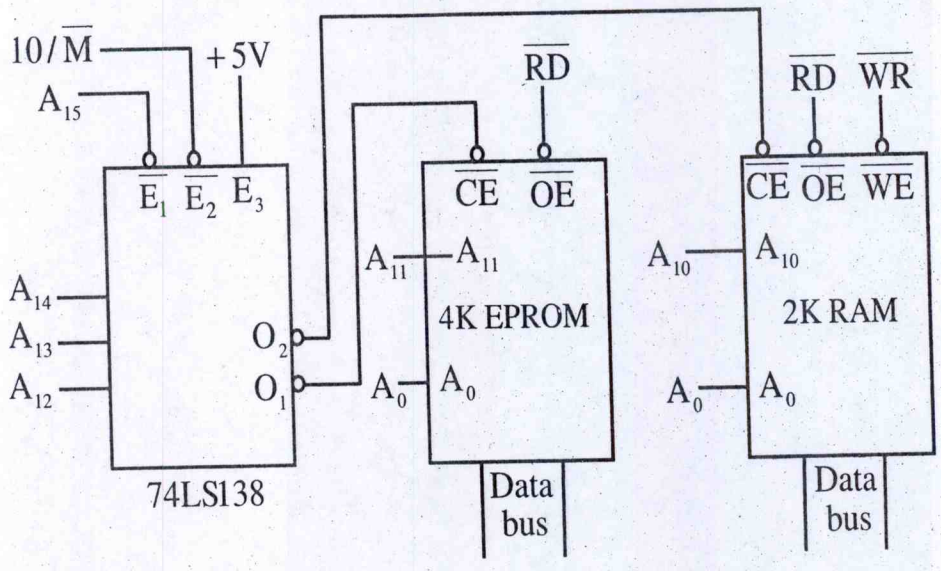
Q.5 State the need of de-multiplexing low-order address bus and the data bus and explain with the help of the schematic diagram.

Q.6 Analyze the given memory interfacing current and specify –

(a) the address range of EPROM and RAM.

(b) the foldback memory address range for RAM.



PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) [2×15=30]

Attempt any two questions

Q.1 Draw the architecture of 8085 and explain the various functional units.

Q.2 Draw the block diagram of Programmable Peripheral Interface 8255 and explain the various modes of 8255. Determine the control word and write instructions to initialize 8255 in Mode 0 to configure Port A and Port CU as input Ports and Port B and Port CL as input ports. Assume address of control register to be 8003 H.

Q.3 Define 'Stack'. Write a program to read and complement the contents of the flag register.

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5E1352

Roll No. _____ Total No. of Pages: 3

5E1352

B. Tech. V - Sem. (Main / Back) Exam., January - 2022

Computer Science & Engineering

5CS4 – 02 Compiler Design

CS, IT

Time: 3 Hours **Maximum Marks: 120**

Min. Passing Marks: 42

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[10×2=20]**

All questions are compulsory

Q.1 What is Lexical Analyzer?

Q.2 What do you mean by Context-free grammar?

Q.3 What do you mean by Activation record?

Q.4 Give the full form and definition of DAG.

Q.5 What is Intermediate Code?

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Q.6 What is Input buffering?

Q.7 What is YACC error handling in LR Parser?

Q.8 Difference between Bottom-up and Top-down parsing.

Q.9 What do you mean by Peephole Optimization?

Q.10 Explain different types of errors in compilers.

PART – B

(Analytical/Problem solving questions) **[5×8=40]**

Attempt any five questions

Q.1 What are the phases of a Compiler? Explain the function of each phase in brief.

Q.2 Describe Bootstrapping in detail.

Q.3 Write a short note on operator precedence parsing and function.

Q.4 Explain the symbol table management system.

Q.5 What do you mean by basic block? Also explain in detail the transformation in basic block.

Q.6 Construct a DAG for the basic block whose code is given below –

D : = B * C

E : = A + B

B : = B * C

A : = E – D

Q.7 Explain in brief the various issues of design of a code generator.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[4×15=60]**

Attempt any four questions

Q.1 Consider the following grammar G -

$E \rightarrow E + T \mid T$

$T \rightarrow TF \mid F$

$F \rightarrow F * \mid a \mid b$

(a) Construct the SLR parsing table for this grammar

(b) Construct the LALR parsing table

Q.2 Define syntax directed definition. Explain the various forms of syntax directed definition.

Q.3 Translate the arithmetic expression –

$(a + b) * (c + d) + (a + b + c)$ into

(a) Syntax tree

(b) Three address code

(c) Quadruple

(d) Triples

Q.4 Consider the following basic block and then construct the DAG for it.

$t_1 = a + b$

$t_2 = c + d$

$t_3 = e - t_2$

$t_4 = t_1 - t_3$

Q.5 Explain different storage allocation strategies.

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5E1353

Roll No. _____ Total No. of Pages: 3

5E1353

B. Tech. V - Sem. (Main / Back) Exam., January - 2022

Computer Science & Engineering

5CS4 – 03 Operating System

CS, IT

Time: 3 Hours **Maximum Marks: 120**

Min. Passing Marks: 42

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[10×2=20]**

All questions are compulsory

Q.1 What is kernel?

Q.2 What is thread?

Q.3 What is deadlock?

Q.4 Define logical and physical address.

Q.5 What are context switches?.

Q.6 Differentiate between pager and swapper.

Q.7 Explain the features of Operating System.

Q.8 What are frames?

Q.9 What is thrashing?

Q.10 Explain 'valid' and 'invalid' bit in page table.

PART – B

(Analytical/Problem solving questions) **[5×8=40]**

Attempt any five questions

Q.1 What are preemptive and non-preemptive scheduling process? Explain the process state diagram in detail.

Q.2 What are the necessary conditions for deadlock? Explain resource graph model and safe-unsafe states with a suitable example.

Q.3 Explain the followings -

(a) Inter-process Communication.

(b) Mutual Exclusion and Race Condition.

(c) Critical Section.

Q.4 What do you mean by demand paging? Explain virtual memory and page fault concept in detail.

Q.5 What is file management? Explain its types and structures.

Q.6 Differentiate between Windows and Linux based operating system.

Q.7 What is Memory Management Unit (MMU)? Explain Best Fit, Worst Fit and Quick Fit Algorithms in detail.

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PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[4×15=60]**

Attempt any four questions

Q.1 Consider the following page reference string 1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 4, 5
Compare the number of page faults with frame size 3, 4 with FIFO & LRU page replacement algorithm. Also explain Belady's anomaly in detail.

Q.2 (a) Explain the difference between long term, short term and medium term schedulers.

(b) Explain the layered approach of the Operating System.

Q.3 For the following set of process, find the average waiting time and turn around time using Gantt chart for –

(a) SJF

(b) Priority scheduling process

Process	Burst time (ms)	Priority
P1	5	5
P2	3	4
P3	8	3
P4	2	1
P5	1	2

Q.4 Suppose a disk drive has 200 cylinders. The drive is initially at cylinder position 98.
The queue with request from I/O to blocks on cylinders –
86, 147, 91, 177, 94, 150, 102, 175, 130
What is the total head movement needed to satisfy the request for SCAN and C-SCAN scheduling algorithm?

Q.5 Explain the followings –

(a) Data Structure of Bankers Algorithm

(b) Segmentation

(c) File Security

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5E1354

Roll No. _____ Total No. of Pages: 3

5E1354

B. Tech. V - Sem. (Main / Back) Exam., January - 2022

Computer Science & Engineering

5CS4 – 04 Computer Graphics & Multimedia

CS, IT

Time: 3 Hours **Maximum Marks: 120**

Min. Passing Marks: 42

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[10×2=20]**

All questions are compulsory

Q.1 What is resolution in computer graphics?

Q.2 Explain Raster Scan System.

Q.3 Define Aspect ratio.

Q.4 What is the role of Scaling?

Q.5 What is point clipping?

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Q.6 What does text clipping mean? Explain.

Q.7 What is Animation?

Q.8 What is Morphing?

Q.9 What is Translation?

Q.10 What is Scan conversion?

PART – B

(Analytical/Problem solving questions) **[5×8=40]**

Attempt any five questions

Q.1 Discuss properties of Bezier curves.

Q.2 Describe Phong shading in detail.

Q.3 Explain scan conversion, write Bresenham's algorithm of line m > 1.

Q.4 Explain in brief RGB, CMY and HSV colour models.

Q.5 Draw a circle having radius r = 10, using mid-point circle generation algorithm.

Q.6 Write short note on –

(a) Cathode ray tube

(b) Anti-aliasing technique

Q.7 Write short note on –

(a) Shadow mask technique

(b) Beam penetration technique

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[4×15=60]**

Attempt any four questions

Q.1 What is Homogeneous Coordinate? Discuss the composite transformation matrices for two successive translation and scaling.

Q.2 Describe different types of parallel projection used in computer graphics.

Q.3 What is Animation? What are the challenges faced in its implementation? Write the steps in generation of animation.

Q.4 Use Cohen-Sutherland line clipping algorithm to find the visible portion of the line P(40, 80), Q(120, 30) inside the window, the window is defined as ABCD – A(20, 20), B(60, 20), C(60, 40) and D(20, 40)

Q.5 Explain the followings –

(a) Diffuse reflection and Specular reflection

(b) Phong shading

(c) Ray tracing

(d) RGB and CMY colour models

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5E1355

Roll No. _____ Total No. of Pages: 3

5E1355

B. Tech. V - Sem. (Main / Back) Exam., March - 2022

Computer Science & Engineering

5CS4 – 05 Analysis of Algorithms

CS, IT

Time: 3 Hours **Maximum Marks: 120**

Min. Passing Marks: 42

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[10×2=20]**

All questions are compulsory

Q.1 Define Time Complexity.

Q.2 Explain an algorithm with its steps.

Q.3 Define 0/1 Knapsack problem.

Q.4 What are the differences between Greedy method and Dynamic Programming?

Q.5 Discuss lower bound theory.

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Q.6 What do you mean by pattern matching?

Q.7 Define Randomized algorithm.

Q.8 What is assignment problem?

Q.9 Define set cover problem.

Q.10 What is decision problem?

PART – B

(Analytical/Problem solving questions) **[5×8=40]**

Attempt any five questions

Q.1 Explain merge sort. Using merge sort algorithm sort the following sequence –

38, 42, 24, 68, 45, 12, 88, 32.

Q.2 Using Quick sort algorithm sort the following sequence-

A= {13,19,9,5,12,8,7,4,21,2,6,11}.

Q.3 Solve the TSP problem for the following cost matrix –

	w	x	y	z
w	A	8	13	18
x	3	A	7	8
y	4	11	A	10
z	6	6	7	A

Q.4 Explain Quadratic assignment problem using a suitable example.

Q.5 Prove that the Hamilton cycle problem is NP-Complete.

Q.6 Find optimal parenthesization of matrix chain product whose sequence of dimension is (6, 12, 6, 42, 7).

Q.7 Describe Naive String Matching Algorithm in detail.

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PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[4×15=60]**

Attempt any four questions

Q.1 Show the Strassen's multiplication for the following matrices –

$$A = \begin{bmatrix} 2 & 5 \\ 7 & 9 \end{bmatrix} \text{ and } B = \begin{bmatrix} 6 & 2 \\ 8 & 5 \end{bmatrix}$$

Explain the longest common subsequences in detail.

Q.2 How and when dynamic programing approach is applicable? Discuss matrix chain multiplication with reference to dynamic programing technique. Explain 0/1 Knapsack problem with suitable example.

Q.3 Discuss Boyer Moore algorithm. Find the pattern ABCBC in the text ACABABCABCBCA using KMP matcher.

Q.4 Briefly, describe flow shop scheduling and network capacity assignment problem. Compare Las Vegas and Monte Carlo algorithmic approaches also.

Q.5 Prove that circuit satisfiability problem belongs to the class NP. Explain approximation algorithm for vertex cover.

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5E1356

Roll No. _____ Total No. of Pages: 2

5E1356

B. Tech. V - Sem. (Main / Back) Exam., January - 2022
PCC / PEC Computer Science & Engineering
5CS5 – 11 Wireless Communication
CS, IT

Time: 2 Hours **Maximum Marks: 80**

Min. Passing Marks: 28

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of five questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[5×2=10]**

All questions are compulsory

Q.1 What is slow fading?

Q.2 What is a cellular concept?

Q.3 Give OFDM principle.

Q.4 What is linear equalization?

Q.5 What is the need of MIMO system?

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PART – B

(Analytical/Problem solving questions) **[4×10=40]**

Attempt any four questions

Q.1 Write short note on 'PAPR'.

Q.2 What is soft hand off?

Q.3 Explain Doppler spread and coherence time.

Q.4 Short note on LMS algorithm.

Q.5 Explain the transmitter diversity.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[2×15=30]**

Attempt any two questions

Q.1 Explain with suitable example FDMA, TDMA and CDMA.

Q.2 What are the different principles of offset-QPSK. Explain with a suitable diagram Gaussian Minimum Shift Keying. Also give the difference between P/4 OQPSK and MSK.

Q.3 Explain the importance of wireless system? With a suitable diagram explain the transmit beamforming, receiver beamforming and opportunistic beamforming.

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5E1357

Roll No. _____ Total No. of Pages: 2

5E1357

B. Tech. V - Sem. (Main / Back) Exam., January - 2022
PCC / PEC Computer Science & Engineering
5CS5 – 11 Human Computer Interaction

Time: 2 Hours **Maximum Marks: 80**

Min. Passing Marks: 28

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) [5×2=10]

All questions are compulsory

Q.1 What is meant by Human-Computer Interaction?

Q.2 Explain limitations of GOMS.

Q.3 Define Norman's model of interaction.

Q.4 What are goals of design?

Q.5 State Hierarchical Task Analysis (HTA).

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PART – B

(Analytical/Problem solving questions) **[4×10=40]**

Attempt any four questions

Q.1 Draw the block diagram representing Human-Computer Interaction framework and discuss it.

Q.2 Explain in detail about the Evaluation Techniques.

Q.3 Write short note on –

(a) Engineering task models

(b) Concur Task Trees (CTT)

Q.4 Explain Empirical Research methods for Human-Computer Interaction with suitable example.

Q.5 Discuss in detail about GUI design and Aesthetics.

Q.6 Describe Nielsen's ten heuristics with example of its use heuristics evaluation.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[2×15=30]**

Attempt any two questions

Q.1 Write short note on –

(a) OOP introduction

(b) Object oriented modeling of user interface design

Q.2 Explain introduction to formalism in dialog design and also explain Finite State Machines with suitable example.

Q.3 Discuss in detail about experimental design and data analysis with explanation of one-way ANOVA.

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5E1400

Roll No. _____ Total No. of Pages: 2

5E1400

B. Tech. V - Sem. (Main / Back) Exam., March - 2022

PCC/PEC Information Technology

5IT5 – 12 Software Testing and Project Management

Time: 2 Hours **Maximum Marks: 80**

Min. Passing Marks: 28

Instructions to Candidates:

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[5×2=10]**

All questions are compulsory

Q.1 What do you mean by Software Project Management? [2]

Q.2 State the concept of Data Flow based Testing. [2]

Q.3 Define Mutation Testing. [2]

Q.4 How Object Oriented Testing is different from Procedural Testing? [2]

Q.5 Define Surface Structure Testing on Object Oriented Testing. [2]

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PART – B

(Analytical/Problem solving questions) **[4×10=40]**

Attempt any four questions

Q.1 Explain the Major Activities carried out by a Software Project Manager and the Order in which these are carried out? [10]

Q.2 What is Decision Table based testing? Explain, how and why different from other Functional Techniques. [10]

Q.3 What is Regression Testing? Explain different types of Regression Testing. [10]

Q.4 Explain the concept of Inheritance in terms of testing of Object Oriented Systems with suitable examples. [10]

Q.5 Describe the UML. How it is useful in Object Oriented Modelling? [10]

Q.6 Discuss the salient features of GUI Testing. How is it different from Normal Testing? [10]

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[2×15=30]**

Attempt any two questions

Q.1 Explain the Software Process models. Describe project planning and organization of Project Team. [15]

Q.2 What is Integration Testing? Explain the different approaches of Integration Testing. [15]

Q.3 Draw Activity diagram for Online Banking System and Generate Test cases using this Activity diagram. [15]

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5E5101

Roll No. _____ Total No. of Pages: 2

5E5101

B. Tech. V - Sem. (Back) Exam., March - 2022

Computer Science & Engineering

5CS1A Computer Architecture

CS, IT

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT- I

Q.1 (a) Explain Flynn classification of computer architecture based on streams. [6]

(b) Is there any difference among Software, Hardware and Firmware? Explain. [6]

(c) Define Common Bus System. [4]

OR

Q.1 (a) Describe the Von-Neumann model and explain the functioning of its components in detail. [8]

(b) Explain all the addressing modes with appropriate examples. [8]

UNIT- II

Q.2 (a) What is advantage of pipelining? Explain instruction pipeline in detail. [8]

(b) Is there any difference between RISC and CISC computers? Explain. [8]

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OR

Q.2 (a) Explain speedup, efficiency and throughput in pipelining. [8]

(b) Explain arithmetic pipeline with a neat and clean diagram and example. [8]

UNIT- III

Q.3 (a) Draw and explain flowchart for addition and subtraction of floating point numbers. [8]

(b) Multiply 10101 and 11011 using Booth multiplier algorithm. Show the steps. [8]

OR

Q.3 (a) Explain array multiplier with a suitable example. [8]

(b) Divide 0100100001 by 11001 using restoring division algorithm. Show the steps. [8]

UNIT- IV

Q.4 (a) Design a 16 by 4 RAM. Explain binary cell also. [10]

(b) Write the concept of paging and segmentation. [6]

OR

Q.4 (a) What are 3 different cache memory schemes? Explain in detail with examples. [12]

(b) Write down the concept of virtual memory. [4]

UNIT- V

Q.5 (a) Explain in short programmed I/O and interrupt initiated I/O. [8]

(b) What are the various modes of data transfer to and from the computer system? Explain. [8]

OR

Q.5 Write and explain the followings in detail - [2×8=16]

(a) Direct Memory Access

(b) Input Output Processor

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5E5102

Roll No. _____ Total No. of Pages: 2

5E5102

B. Tech. V - Sem. (Back) Exam., March - 2022

Computer Science & Engineering

5CS2A Digital Logic Design

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions**, selecting **one question** from **each unit**. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT- I

Q.1 (a) Give the syntax and the example for the following -

(i) Process statement [2]

(ii) Case statement [2]

(iii) NULL statement [2]

(iv) With select statement [2]

(b) What are the Data type in VHDL? Explain with example. [8]

OR

Q.1 (a) Explain with example the lexical elements of VHDL language. [8]

(b) Explain the concept of Look Ahead Carry Adder. [8]

UNIT- II

Q.2 (a) What is the difference between procedure and function? [8]

(b) Describe the resolved signals with suitable example and explain. [8]

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OR

Q.2 (a) Explain components & configuration in VHDL. [8]

(b) What is difference of Generate and Concurrent statement? Explain with suitable example. [8]

UNIT- III

Q.3 (a) Explain clock skew, set uptime and Hold time with suitable examples. [8]

(b) Describe the step of synchronous sequential circuit with suitable example. [8]

OR

Q.3 (a) Explain concept and working of FPGA and PDA. [8]

(b) What do you mean by state reduction techniques? [8]

UNIT- IV

Q.4 (a) What is Hazard? Define Logic Hazards and function Hazards. [8]

(b) What do you mean by event driven circuit? [8]

OR

Q.4 (a) What do you understand by dynamic Hazards? Explain with examples. [8]

(b) Explain the procedure of state reduction of incompletely specified machines with suitable examples. [8]

UNIT- V

Q.5 (a) Write short note on -

(i) SRAM [4]

(ii) Look-up table technology [4]

(b) What is the importance of Altera stratix? [8]

OR

Q.5 (a) Why we use FPGA kits and explain logic elements and programmability? [8]

(b) Write short note on –

(i) Extended logic elements [4]

(ii) Xilinx Virtex-II pro [4]

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5E5103

Roll No. _____ Total No. of Pages: 2

5E5103

B. Tech. V - Sem. (Back) Exam., January - 2022
Computer Science & Engineering
5CS3A Telecommunication Fundamentals
CS, IT

Time: 3 Hours **Maximum Marks: 80**
Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT- I

Q.1 (a) What are the various transmission impairments? Explain in brief. [5]

(b) Distinguish between synchronous and asynchronous communication systems. [5]

(c) Explain sliding window protocol. [6]

OR

Q.1 (a) Draw and explain OSI/ISO reference model in computer network communication. [10]

(b) Differentiate between analog and digital transmission. [6]

UNIT- II

Q.2 (a) Explain linear codes and how error you detect and correct using linear code techniques. [8]

(b) Explain pure Aloha and slotted Aloha. Give relationship in terms of their throughput. [8]

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OR

Q.2 (a) Explain the frame structure of Point to Point Protocol. What is the difference between HDLC and PPP? [8]

(b) Discuss channel allocation problem in MAC sub layer. [8]

UNIT- III

Q.3 (a) Draw and explain 802.11 architecture and protocol stack. [8]

(b) Explain spanning tree protocol in detail. [8]

OR

Q.3 (a) What is hidden node and exposed node problem? Explain with example. [8]

(b) Explain Bluetooth architecture and protocol stack in detail. [8]

UNIT- IV

Q.4 (a) Explain and compare Synchronous TDM and Statistical TDM. [4]

(b) What is the TDMA super frame structure? Explain. [4]

(c) Explain DS1, DS3 carriers in detail. [8]

OR

Q.4 (a) What is switching? Explain space-time-space division switching in detail. [10]

(b) What is slip rate in digital terrestrial networks? [6]

UNIT- V

Q.5 (a) What is Frequency-Hopping Spread Spectrum (FHSS)? Explain in detail. [8]

(b) Explain CDMA. Differentiate between forward and reverse CDMA channel. [8]

OR

Q.5 Write short notes on -

(a) IMT-2000 [8]

(b) Orthogonal code and gold sequences [8]

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5E5104

Roll No. _____ Total No. of Pages: 3

5E5104

B. Tech. V - Sem. (Back) Exam., March - 2022

Computer Science & Engineering

5CS4A Database Management Systems

CS, IT

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT- I

Q.1 (a) Briefly explain the History of Database Management System? Explain the diagram of system structure of DBMS? [10]

(b) What is the difference between DDL and DML? [6]

OR

Q.1 (a) Explain the advantage of Database Management System over file management system. [8]

(b) Describe the various functions of Database Administrator? [8]

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UNIT- II

Q.2 (a) What is the meaning of constraints? Explain the Participation constraints and key constraints? [8]

(b) Explain the following terms - [8]

(i) Discriminator

(ii) Identifying Relationship

(iii) Owner Entity sets

OR

Q.2 (a) What is the Entity Relationship model? Explain ER modelling with help of database for a Banking Management System? [8]

(b) Difference between Ternary Relationship and Aggregation? [8]

UNIT- III

Q.3 (a) Explain the following terms- [8]

(i) Formal Definitions

(ii) Safety Expressions

(b) Explain the Relationship Algebra Joints. [8]

OR

Q.3 (a) Explain the various types of inner join operations. [8]

(b) Consider the following schema – [8]

Employee (Person-name, Sheet, City)

Works (Person-name, Company-name, Salary)

Manager (Person-name, Manager-name)

Write the following queries in Relational Algebra -

(i) Find the name of all employees who work for "First Bank".

(ii) Find the names of all employees who do not work for "Small Bank"?

(iii) Find the names of all employees who live in the same city and on the same city as do their managers.

UNIT- IV

Q.4 (a) What is JDBC? Explain establishing a connection to the data base, create statement, execute query set in JDBC. [8]

(b) Explain Embedded. SQL and Dynamic SQL? [8]

OR

Q.4 (a) Explain the features of Nested Queries in SQL to devlop complex queries? [6]

(b) Why we need to access a database using general purpose programming language? [6]

(c) What is triggers? How do we create triggers on a Database? [4]

UNIT-V

Q.5 (a) Justify that 3NF is stronger than 2NF? [8]

(b) Define 3NF (III Normal Form) and BCNF (Boyce Codd Normal Form) with example. [8]

OR

Q.5 (a) Explain lossy and lossless join decomposition? [4]

(b) Why we need normalization? [4]

(c) Define the following -

(i) Fully function dependency [4]

(ii) Multivalued dependency [4]

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5E5105

Roll No. _____ Total No. of Pages: 4

5E5105
B. Tech. V - Sem. (Back) Exam., March - 2022
Computer Science & Engineering
5CS5A Operating Systems
CS, IT

Time: 3 Hours **Maximum Marks: 80**
Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT- I

Q.1 (a) What is Operating System? What are the main agents of operating system? How does it interact with devices? [8]

(b) Explain context switching of processes and threads. [8]

OR

Q.1 (a) Discuss the various states of process using a suitable diagram. [8]

(b) Explain the multithreading model with its benefits. [8]

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UNIT- II

Q.2 (a) Define critical section problem. How are semaphores used for solving critical section problem? [8]

(b) Consider the following set of processes assumed to have arrived at time 0, in the order P_1, P_2,.....P_5 with the length of the CPU burst time given in milliseconds - [8]

Process	Burst time	Priority
P_1	10	3
P_2	1	1
P_3	2	3
P_4	1	2
P_5	5	5

Using priority scheduling, obtain the Gantt chart and average waiting time.

OR

Q.2 (a) What is Dining Philosophers Problem? Explain the solution of this problem by using a suitable example. [8]

(b) Explain the following scheduling criteria – [8]

(i) Turnaround time

(ii) Response time

(iii) Throughput

(iv) Process utilization

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UNIT- III

Q.3 (a) Explain Banker's algorithm for deadlock avoidance with an example. [8]

(b) There are 2 jobs of sizes 25 and 12 to be allocated memory. The free space table is- [8]

Address	Size
005	02
009	17
210	89
383	13
490	11

Apply best fit, first fit and worst fit scheme and show allocated addresses and free space table after allocation.

OR

Q.3 (a) Explain free space management using bitmap, link list/free list. [8]

(b) What is Deadlock? What are the necessary conditions for deadlock to occur? Explain. [8]

UNIT- IV

Q.4 (a) Explain the inverted page table in detail. [8]

(b) Write short note on demand paging. [8]

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OR

Q.4 (a) What is virtual memory? Explain the use of virtual memory using a suitable example. [8]

(b) Explain the Page Replacement Algorithm in detail. [8]

UNIT- V

Q.5 (a) Define file system. Explain file operations in detail. [8]

(b) Explain various file system features of windows operating system. [8]

OR

Q.5 (a) Discuss the concept of spooling with all its types and its advantages and disadvantages. [8]

(b) Write short notes on – [8]

(i) Input/output devices

(ii) Scan scheduling

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5E5106

Roll No. _____ Total No. of Pages: 2

5E5106

B. Tech. V - Sem. (Back) Exam., March - 2022

Computer Science & Engineering

5CS6.1A Advanced Data Structure

CS, IT

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT- I

Q.1 (a) State the condition under which insertion of a vertex in the Red-Black tree will result in a sequence of recolouring steps that terminate with the root changing colour. [8]

(b) Suppose we build the Huffman code tree for the set of letters and frequencies given below – [8]

Character	:	A	B	C	D	E	F
Frequency	:	1	5	20	30	40	50

What will be the length of the code for the character B?

OR

Q.1 (a) Explain the concept of 2-3 tree. How can keys be inserted into it? Comment on the efficiency of search operation on a 2-3 tree. [8]

(b) What is dynamic order statistics? Explain the advantages of splay tree in representation of dictionaries. [8]

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UNIT- II

Q.2 (a) Explain the implementation of a binomial heap and its operation with suitable example. [8]

(b) Explain the various techniques used in amortized analysis. [8]

OR

Q.2 (a) Write algorithm to explain Insertion and Decreasing key operation in Fibonacci Heap with the help of suitable example. [10]

(b) Prove that total number of nodes in Binomial Heap at depth is ${}^{k}C_{i}$ for i = 0,1,.....,k. [6]

UNIT- III

Q.3 Explain Ford Fulkerson Man flow algorithm with help of example. [16]

OR

Q.3 Define these terms -

(a) Cut Vertices [4]

(b) Isomorphic Components [4]

(c) Breadth First Search [4]

(d) Spanning Trees [4]

UNIT- IV

Q.4 (a) What is zero-one principle? Describe in detail. [8]

(b) Explain the bitonic sorting network with suitable example. [8]

OR

Q.4 (a) Explain various operations on Disjoint set also describe its union-find problem. [8]

(b) Explain Priority Queue and concatenable Queue in 2-3 tree in detail. [8]

UNIT- V

Q.5 Write short note on -

(a) Computation of Discrete logarithm [8]

(b) Modular Arithmetic [8]

OR

Q.5 (a) Satisfy the following congruence in Chinese remainder theorem. Find X? [8]

P1 : x = 2 (mod 3), P2 : x = 3 (mod 5), P3 : x = 2 (mod 7)

(b) Explain Fermat Primality and Miller-Rabin primality test in detail. [8]

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5E5107

Roll No. _____ Total No. of Pages: 3

5E5107

B. Tech. V - Sem. (Back) Exam., March – 2022

Computer Science & Engineering

5CS6.2A Digital Signal Processing

CS, IT

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks: 24

Instructions to Candidates:

*Attempt any **five questions,** selecting **one question** from **each unit.** All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT- I

Q.1 (a) Determine the impulse response for the causal LTI system - [8]

$y(n) - 1/2\ y(n-1) = x(n) + 2\ x(n-1)$

(b) State and explain the transfer function of an LTI system. [8]

OR

Q.1 (a) Define the terms: linearity, time invariance and causality for a discrete time system. [8]

(b) Determine the frequency response for the system given by - [8]

$y(n) - 3/4\ y(n-1) + 1/8\ y(n-2) = x(n) - x(n-1)$

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UNIT- II

Q.2 (a) Find inverse Z-transform of - [8]

$X(z) = 1/(1 + z^{-1}) (1 - z^{-1})^2$, ROC $|z|>1$

(b) State and prove various properties of Z-transform. [8]

OR

Q.2 (a) Find Z-transform & ROC for the following sequence - [8]

$x(n) = 7(1/3)^n u(n) - 6 (1/2)^n u(n)$

(b) Determine the causal signal x(n) if its Z-transform X(z) given by -

$X(z) = 1 + 3z^{-1} / 1 + 3z^{-1} + 2z^{-2}$ [8]

UNIT- III

Q.3 (a) Explain the following terms - [8]

(i) Up–sampling

(ii) Down–sampling

(b) What is Aliasing? Explain in detail with spectral details of a sample data. [8]

OR

Q.3 (a) Explain the interpolation techniques for the reconstruction of a continuous time signal from its samples. [8]

(b) What is sampling? Determine the Nyquist rate & Nyquist interval for the following signal $x(t) = 1/(t) = 1/\pi t \sin(500\pi t)$. [8]

UNIT- IV

Q.4 (a) With the help of N = 8, explain radix-2 decimation-in-frequency (DIF) FFT algorithm for computation of DFT. [8]

(b) Find the linear convolution of the sequences x[n] = {1, 4, 0, 9, -1} and h[n] = {-3, -4, 0, 7}. [8]

OR

Q.4 (a) Compute the FFT for the sequence $x(n) = n + 1$, where $N = 8$ using DIT algorithm. [8]

(b) Explain the various properties of DTFT. [8]

UNIT- V

Q.5 (a) Differentiate FIR and IIR filters. What are parameters on which the choice of FIR or IIR is made during the design of a digital filter? [8]

(b) The transfer function of analog filter is - [8]

$H_a(s) = 3/(s + 2)(s + 3)$

With T = 0.1 sec. Design the digital filter using Bilinear Transformation Technique.

OR

Q.5 (a) The system function of analog filter is as given - [8]

$H_a(s) = s + 0.1/(s + 0.1)^2 + 9$

Obtain the system function of IIR digital filter using impulse invariance method.

(b) Write a short note on – [8]

(i) Butterworth Filters

(ii) Chebyshev Filters
