

(3 Hours)

[Total Marks: 80]

N. B.: (1) Question No. 1 is compulsory.

(2) Attempt any **THREE** questions from the remaining five questions.

(3) Assume suitable data if necessary.

(4) Figures to the right indicate full marks.

Q1. Attempt **any four** questions.

20

- Compare Power MOSFET and SCR.
- Explain trapezoidal rule for ODE solvers.
- Explain PI control of DC-DC convertors.
- Explain the switching process in multilevel inverters.
- Explain phase-locked loop system.

Q2. a) Explain conductivity modulation of IGBT with creation of inversion layer. 10

- b) Explain any transformation used for converting the electrical quantities from 3-phase to stationary reference frame. Are these transformations power invariant? Justify. 10

Q3. A) Derive the linear models for AC-AC and DC-DC converters. How will you analyze their closed-loop stability? Explain. 10

- b) Draw diagram of ZOH device and explain the same in detail. 10

Q4. A) Explain the on-line and line-interactive topologies for inverters. Give one example of each. 10

- b) Explain parallel operation of inverters in master and slave mode of control. 10

Q5. A) Explain the DIAC-TRIAC firing circuit used as light dimmer with the help of waveforms. 10

- b) Explain 3-phase full wave controller with RL load with a firing angle of 30 degrees. 10

Q6. Write short notes on (any two)

- (a) Anti-saturation protection for BJT and IGBT.
- (b) Features of circuit oriented simulators.
- (c) Second-order hold circuit.
- (d) Droop control method for inverters.

Duration: 03 hours

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N.B: 1) Attempt any 4 questions out of 6 questions

2) Assume suitable data wherever necessary

Q.1.a) Explain branch prediction logic techniques of Pentium processor with BTC history table? [10]

b) Explain architecture and software model of 80386 with neat diagram? [10]

Q.2] a) Explain in order and out of order execution methods with suitable examples? [10]

b) Explain code cache structure, line storage algorithm and split line access with respect to Pentium processors? [10]

Q.3] a) Explain virtual memory management of 80386 processor with neat diagram? [10]

b) Explain cache structure and split line access with respect to Pentium processors? [10]

Q.4] a) List all dependencies of Instruction Level Parallelism with suitable example? [10]

b) With neat diagram state the features, types and advantages of Multiprocessor Organization? [10]

Q.5] a) Highlight on instruction level parallelism and compare with machine level parallelism with suitable examples? [10]

b) Compare in detail Cluster and NUMA multiprocessor organizations? [10]

Q.6] **Write short notes:** [20]

a) SMP and CMP

b) Laws of Parallelism

c) VLIW processors

d) Protection mechanism of 80386

(3 Hours)

[Total Marks 80]

N.B.:1) Q.1 is compulsory

- 2) Attempt any **three** from remaining **five** questions
- 3) All questions carry equal marks

Q.1 a). Explain global perspective of cybercrime

[10]

b). What are the attacks on Mobile Phones.

[10]

Q.2 a). Explain Credit card frauds in Mobile and Wireless Computing.

[10]

b). What do you mean by Virus , Worms, Trojans and Malware and discuss protection mechanism against them.

[10]

Q.3a). What are the devices related to security issue.

[10]

b) Explain e-commerce and its types

[10]

Q.4 a). Explain various Keyloggers along with the role of anti Keyloggers.

[10]

b) Discus in details amendment made in IT Act 2000.

[10]

Q.5 a). Explain cloud computing with cyber-attacks.

[10]

b) What is blind SQL Injection attacks? Discuss mitigation of SQL Injection attack.

[10]

Q.6 Short note on (any two)

[20]

a) The adjudication and appeals Under IT Act 2008

b) Global Trends in Cyber Law

c) Information Security Standard compliances

Time: 3 Hours

Marks: 80

- N. B. 1) Question **No.1** is compulsory.
 2) Solve **any three** questions from remaining questions.
 3) Assume suitable data if necessary.
- 1 Attempt any **Four** questions.
- (a) Discuss the mixed signal layout strategy model and its importance in analog circuits. 5
- (b) Explain the implementation of NOR based ROM with the help of an example. 5
- (c) Explain how Schmitt trigger circuit can be used to clean up noise in interconnect signals. 5
- (d) What is the remedy to overcome the limitations of NMOS and PMOS switches? 5
- (e) Define and explain the terms Differential Nonlinearity and integral Nonlinearity in a Digital to Analog data converter. 5
- 2 (a) Explain speed- precision trade off in a switched capacitor circuit. What is figure of merit? 10
- (b) Describe the construction and operation of a 3- bit flash converter with the help of block diagram and transfer curve. 10
- 3 (a) Design a Schmitt Trigger circuit in CMOS technology and obtain the expressions to estimate upper and lower switching point voltages. 10
- (b) Discuss CMOS voltage/ charge pump circuits useful to generate voltages greater than V_{DD} . 10
- 4 (a) Explain the programming techniques used in EPROM with the help of the memory cell construction and operation. 10
- (b) Explain the operation of a five stage inverter based ring oscillator and obtain expressions for the delay and oscillation frequency. 10
- 5 (a) Explain the application of PLL for frequency multiplication. 10
- (b) Discuss the operation of the Successive approximation ADC with the help of block diagram. 10
- 6 Write short notes on **any four**
- (a) Charge injection cancellation techniques in MOSFET Switches 5
- (b) VCO implementation using Schmitt trigger 5
- (c) Advantages and disadvantages of pipeline ADC 5
- (d) Butterfly plot and stability criteria of 6T SRAM cell 5
- (e) Non ideal effects in PLL 5

(3 Hours)

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- N. B.: 1) Question No. 1 is compulsory.
 2) Attempt **any three** questions out of the remaining five questions.
 3) Assume suitable data wherever necessary.

1. Answer the following (any four): 20
- With reference to multipath fading ,explain the following :various types of small scale fading, Coherent bandwidth and Coherence time.
 - Explain the need for adaptive equalizer in digital communication with a neat sketch.
 - State the conditions for a process to be stationary and wide sense stationary
 - Explain the need for adaptive equalizer in digital communication.
 - Bring out the advantages of MIMO system with proper justifications

2. a) A convolution code is described by
 $g_1 = [100], g_2 = [101], g_3 = [111]$
- Draw the convolution encoder corresponding to this code and obtain codeword for the message sequence 11011. 04
 - Draw the State diagram and Trellis diagram. 04
 - Find the transfer function and free distance of this code. 04
- b) Draw neat sketch of Turbo encoder and decoder and explain its working. 8

3. a) The transmission of a signal pulse with a raised cosine spectrum through a channel results in the following (noise-free) sampled output from the demodulator : 10

$$\{X_m\} = \begin{cases} -0.5 & m=-2 \\ 0.1 & m=-1 \\ 1 & m=0 \\ -0.2 & m=1 \\ 0.05 & m=2 \\ 0 & \text{otherwise} \end{cases}$$

- Determine the tap coefficients of a three-tap zero-forcing linear equalizer
 - for the coefficients determined in part(i),determine the equalized output for the case of isolated pulse for $m=\pm 2, \pm 3$
 - determine the residual ISI and its span in time.
- b) With a neat functional block diagram of Linear Transversal equalizer ,explain the two criteria used widely in optimizing the equalizer coefficients. 10
4. a) Explain the decision feedback equalizer with its block diagram and mathematical expressions. 10
- b) State the properties of the auto correlation function of a random process. 5
- c) A random process is defined as $y_n = \frac{X_n + X_{n-1}}{2}$, where X_n is an iid sequence of Gaussian random variables with zero mean and variance σ^2 . Show that y_n is a wide sense stationary process. 5
5. a) With a neat block diagram of FFT-based OFDM transmitter and receiver , explain the following : 10
- give the mathematical expression for the output signal.
 - Why cyclic prefix is to be added?

TURN OVER

- (iii) Synchronization required
 - (iv) Merits and demerits of OFDM
 - b) With a neat block diagram , explain multi carrier CDMA. 10
6. Write short notes on: (Any two)
- a) Blind equalization , its merits and demerits 10
 - b) PAPR in OFDM and methods to reduce it 10
 - c) Diversity techniques and recombining methods 10
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