

Seat Number

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Antenna Theory & Design (1110)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any five** questions.

1. Explain the following antenna parameters with the help of illustrative diagrams and mathematical expression & their significance. 20
 - i) Radiation pattern
 - ii) Radiation intensity
 - iii) Radiation density
 - iv) Radiated power
 - v) Radiation Resistance
 - vi) Effective Aperture
 - vii) Effective Length

2. a) Given Linear uniform array of 10 isotropic elements with a separation of $\frac{\lambda}{4}$ between elements. Find the directivity for the following array 10
 - i) Broad side array
 - ii) Ordinary end fire array
 - iii) Hansen woodyard End fire array

- b) Explain for linear array 10
- i) Array factor
 - ii) Null direction
 - iii) Direction of maxima
 - iv) SLL (Side Lobe level)
 - v) HPBW
3. a) Explain Biconical Antenna in detail. 10
- b) Explain Equiangular spiral antenna. 10
4. a) It is desired to design aperture antenna with uniform illumination so that the directivity is maximized at an angle 30° from the normal to the aperture. Determine the optimum dimension and its associated directivity with aperture is 1. Square 2. Circular 10
- b) Explain in detail different feed mechanisms by using which the parabolic reflector can be illuminated. 10
5. a) Explain Taylor line source TSCHEBYSCHFF – Error method for antenna synthesis. 10
- b) Explain WOODWARD – LAWSON method for antenna synthesis. 10
6. a) Explain integral equation moment method in detail. 10
- b) Explain Log – Periodic Antenna in detail. 10
7. a) What is the diffraction ? List out types of diffraction. Explain any one in detail. 10
- b) Explain E – plane analysis of Horn antenna. 10
8. Write a short notes on: 20
- i) Microstrip antenna
 - ii) Parabolic reflector
 - iii) Yagi – Uda antenna
 - iv) Travelling wave antenna
 - v) Loop antenna

Seat Number

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Advanced Light Wave Communication (1030)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

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3. Students should note, no supplement will be provided.
4. Solve **any five** questions from 1 to 8.
5. Draw suitable diagrams wherever necessary.
6. Assume suitable data if necessary.
7. Figures to right indicates full marks.

- | | | |
|----|--|----|
| 1. | a) Enlist the Magneto optic devices. Explain any one in detail. | 10 |
| | b) List the ternary and qua ternary materials. Explain the fiber bragg gratings. | 10 |
| 2. | a) Describe fiber sensors for current & voltage measurement. | 10 |
| | b) Explain the concept of analog & digital optical transmitter & receiver. | 10 |
| 3. | a) Explain the heterodyne synchronous and non synchronous detection. | 10 |
| | b) Explain the phase diversity reception. Also explain the receiver sensitivity. | 10 |
| 4. | a) Explain the multiplexing techniques for multichannel light wave system. | 10 |
| | b) Consider a $(P, K) = (2, 2)$ shufflenet. | 10 |
| | i) Draw the interconnections between the nodes. | |
| | ii) How wavelengths are needed in the network. | |

5. a) Explain the solution based communication principles. 10
b) Explain WDM solution system in detail. 10
6. a) Explain single hop & multi hop networks in detail. 10
b) Explain the wavelength routed network. Also explain the ultrahigh capacity network. 10
7. a) Explain the Excess loss & Insertion loss. 10
b) Explain the dispersion compensation techniques. 10
8. a) Explain the Microwave photonics in detail. 10
b) Explain the SONET / SDH Rings in detail. 10

Seat Number

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Advanced Digital Signal Processing & Processors (1010)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any five**. Each questions carries equal marks.
5. Draw well label diagram and assume suitable data whenever necessary.

1. a) State and prove following properties of Fourier transform
 - i) Time reversal
 - ii) Time shifting
- b) Compute 8 point DFT of the sequence $x(n) = \{0, 1, 2, 3\}$. Sketch the magnitude and phase plot also.
2. a) The system transfer function of analog filter is given by,

$$H(s) = \frac{s + 0.1}{(s + 0.1)^2 + 16}$$
 Obtain the system transfer function of digital filter BLT which is resonant at $\omega_r = \Pi/2$.
 - b) Explain Butterworth and Chebyshev approximation IIR Filter.
3. a) What are FIR filter characteristics? Show that for symmetric or anti-symmetric impulse response, it gives Linear phase.
 - b) Explain the Frequency response of Linear Phase FIR Filter.
4. a) Give the advantages and disadvantages of window method.

- b) Design a normalized linear phase FIR filter having phase delay of $\tau=4$ and at least 40 dB attenuation in side band. Also obtain magnitude frequency response of the filter.
5. a) Perform the circular convolution of the following two sequences.
 $x(n) = \{0, 1, 2, 3\}$ $h(n) = \{2, 1, 1, 2\}$
- b) Explain circular shifting of sequences. Prove that the multiplication of two DFTs of two sequences is equivalent to circular convolution of two sequences in time domain.
6. a) Write short note on,
i) Robustness of the LMS filter
ii) Computer experiment on Adaptive prediction.
- b) Comment on statistical LMS theory.
7. a) Explain sampling rate conversion by rational factor I/D in detail.
- b) What is the principle of Downsampling? What is the importance of anti-aliasing filter? Derive the expression for decimated output signal i.e. $y(m)$
8. a) Draw and Explain the Architecture of TMS 320c62XX DSP processor.
- b) Compare DSP processor with general purpose processor.

Seat Number

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ELECTIVE - I
Advanced Telecom Network Management
(1052)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any five** question.

- | | | | |
|----|------|--|--------------------------|
| 1. | a) | Compare between Analog & Digital Microwave Radios. | 10 |
| | b) | Define and Explain in Detail. | 10 |
| | i) | Full Availability | ii) Blocking probability |
| | iii) | GOS | iv) Grading. |
| 2. | a) | Explain cellular Radio Network in detail. | 10 |
| | b) | Explain private National & International numbering scheme and numbering plan for ISDN in detail. | 10 |
| 3. | a) | Explain typical 18GHZ Band DMR- Transceiver. | 10 |
| | b) | Explain Queuing system in detail. | 10 |
| 4. | a) | Explain Satellite System Configuration. | 10 |
| | b) | Explain Data Encryption Standard in detail. | 10 |

5. A) What are the different Classical Encryption Techniques? Explain any one of them in detail. 10
- b) Explain public key algorithm "RSA" in detail. 10
6. a) Compare MDC & MAC. 10
- b) Explain diffie-hellman key Exchange Algorithm in Detail. 10
7. a) What are the different digital signature schemes? Explain any one in detail. 10
- b) What are the different Versions of SHA? List their Characteristics & Explain SHA -512 in detail. 10
8. Write short note on : 20
- 1) B-ISDN
 - 2) Intelligent Network.
 - 3) Elliptic Curve Arithmetic.
 - 4) MD5 Hash function.

Seat Number

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ELECTIVE - I
Linear System Theory
(1053)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Assume Suitable Data if Necessary.
5. Solve **any five** questions.

- | | | |
|----|--|----|
| 1. | a) Discuss the properties of State Transition Matrix. | 10 |
| | b) Explain the Various operations on Matrices. | 10 |
| 2. | a) Explain Empirical rules for the selection of sampling interval? | 10 |
| | b) State and Explain Kalman's Test | 10 |
| 3. | a) Explain Sampled Spectra and Aliasing. | 10 |
| | b) Explain State Space representation of discrete system. | 10 |
| 4. | a) Explain Concept of Eigen Value and Eigen Vector. | 10 |
| | b) What are the limitations of Conventional control Theory? | 10 |
| 5. | a) Explain Principle of Discretisation. | 10 |
| | b) Explain pole state Design. | 10 |
| 6. | a) Explain Stability improvement by State Feedback. | 10 |
| | b) What is filtering? Explain Ideal Low pass Filter. | 10 |

7. a) Explain singular value decomposition (SVD) 10
b) State and Explain Cayley Hamilton Theorem. 10
8. Write note on 20
a) Controllability
b) Observability

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Seat Number

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ELECTIVE - II
Multimedia Communication
(1121)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Solve **any five** questions
5. Assume suitable data if necessary.

- | | | | |
|----|----|---|----|
| 1. | a) | Explain Multimedia information representation in detail. | 10 |
| | b) | Write a note on multimedia network. Give multimedia applications. | 10 |
| 2. | a) | What is video compression? Explain H.261 video compression standard in detail. | 10 |
| | b) | Write a note on MPEG 4 video coding. | 10 |
| 3. | a) | Explain RSVP in detail. | 10 |
| | b) | Write a note on MPEG 1 audio. | 10 |
| 4. | a) | Write a note on DVMRP. | 10 |
| | b) | Classify non real time and real time media. Give the characteristics of real time system. | 10 |

5. a) Write a note on multimedia operating system. 10
b) Why synchronization is needed. Give reference model for multimedia synchronization. 10
6. a) Write a note on H.263 video compression standard 10
b) Explain layered video coding. 10
7. a) Explain RTP in detail. 10
b) Write a note on multimedia operating system resource management and process management. 10

Seat Number

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ELECTIVE - II
Advanced Embedded System Design
(1123)

P. Pages : 1

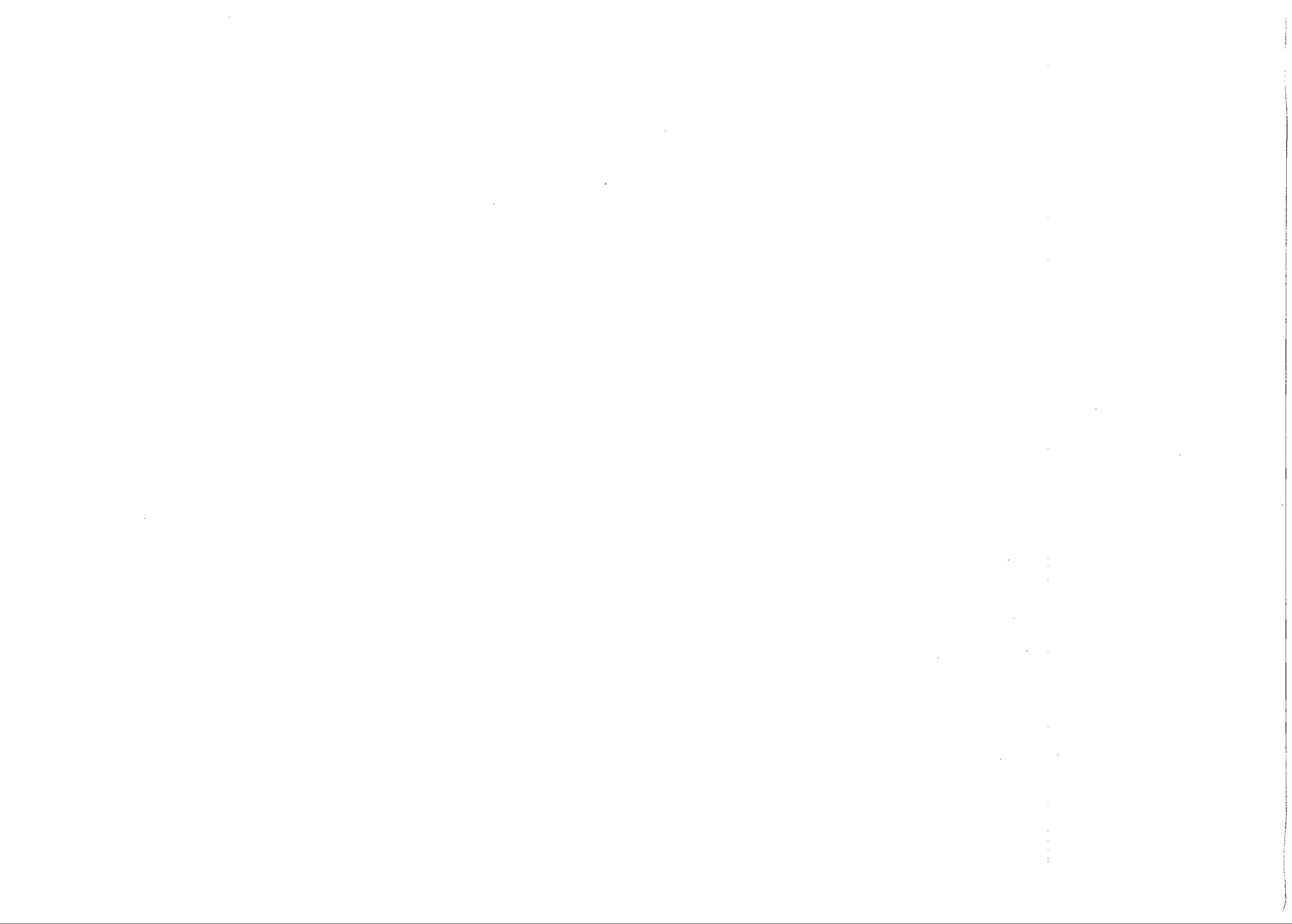
Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any five** questions. Each questions carries equal marks.
5. Use of non programmable calculator is allowed.
6. Assume suitable data if necessary.

- | | | |
|----|--|----|
| 1. | What is Embedded system? List & define the three main characteristics of embedded systems that distinguish such systems form other computing systems. Also explain design metrics with reference to embossed system. | 20 |
| 2. | Explain RT level single purpose processor Design with a suitable design explain. | 20 |
| 3. | Explain in detail with reference to standard single purpose processors
a) Stepper motor controller.
b) LCD Controller. | 20 |
| 4. | Explain serial protocols, parallel protocols & wireless protocols in detail. | 20 |
| 5. | Write in detail about Arbitration, priority Arbiter, Daisy chain Arbitration & network oriented Arbitration methods. | 20 |
| 6. | What is RTOS? What are its different applications? Explain schedule management for multiple tasks by an RTOS. | 20 |
| 7. | With block diagram describe the architecture of ARM7 core & compare its Architecture with ARM9 & ARM11. | 20 |



Seat Number

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ELECTIVE - II
Artificial Intelligence & Soft Computing
(1125)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any five** questions.
5. Illustrate your answer with neat diagram wherever necessary.
6. Assume suitable data if necessary.
7. Use of non-programmable calculator is allowed.

1. a) Explain working and design parameters of each block of a FKBC. 10
b) What are Fuzzy Sets ? List and explain properties of fuzzy set. 10
2. a) Define artificial Neural Network differentiate between ANN and BNN. 10
b) What do mean by unsupervised training. Explain one method for unsupervised training of neural network. 10
3. a) Write algorithm for back propagation training and explain about updation of weights. 10
b) Explain role of neural network in control systems. Discuss about different neuro control approaches. 10
4. a)
$$\tilde{A} = \frac{0.1}{x_1} + \frac{0.3}{x_2} + \frac{0.6}{x_3} + \frac{1}{x_4}$$
 10

$$\tilde{B} = \frac{0.3}{y_1} + \frac{0.6}{y_2} + \frac{0.9}{y_3}$$

for fuzzy sets apply following operators and obtain the result.

- i) Zadeh implication.
- ii) Mamdani implication
- iii) Sharp implication

- b) For a given Fuzzy relation.
 $R = x'$ considerably larger than y'
 $S =$ "y very close to x"

$$R = \begin{bmatrix} 0.8 & 1 & 0.1 \\ 0 & 0.8 & 0 \\ 0.9 & 1 & 0.7 \end{bmatrix}$$

$$S = \begin{bmatrix} 0.4 & 0 & 0.9 \\ 0.9 & 0.4 & 0.7 \\ 0.3 & 0.8 & 0.5 \end{bmatrix}$$

Find $f(x, y) = \overline{RUS} \cap \overline{R} \cup \overline{S} \cap H_0(x, y)$

5. a) With neat diagram explain Neural network predictive control. 10
 b) Discuss Hopfield neural network in detail. Explain two basic operational phases of it. 10
6. a) What is soft computing? Explain application of it. 10
 b) Explain fundamental theorem of Genetic Algorithm. 10
7. a) Design a fuzzy logic control system for applying a brake to the train running with a speed 0-100 Kmph the distance varying from 0.250 m. Find the crisp output brake power when the speed is 50 Kmp and distance is 200 m. 10
 b) Discuss GA in terms of Reproduction, selection and Replacement. 10
8. a) Explain the meaning of term "Artificial Intelligence". 10
 b) Write Short Note on fuzzy- Neuro controller. 10

Seat Number

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Advanced Communication Systems (1040)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Attempt **any five**. Each question carries equal marks.
5. Draw well label diagram and assume suitable data whenever necessary.

1. a) Find the impulse response of the Matched filter.
b) Explain in detail.
 - i) Signal space representation and its significances.
 - ii) Memory less Modulation methods.
2. a) Draw and explain CPFSK and CPM signals.
b) Derive the transfer function of Optimum Filter.
3. a) Explain in detail scalar and vector quantization.
b) Design a BCH code with block length $n = 15$ and error correcting capability $t_c = 1, 2, 3$. Find all primitive polynomials.
4. a) Explain Temporal and spectral waveform coding with suitable example.

- b) Explain for convolution code.
- i) State diagram,
 - ii) Code tree
 - iii) Trellis diagram
5. a) Draw and explain Adaptive Linear Equalization.
- b) What are peak distortion criteria and mean square error criteria ?
6. a) What is ISI ? Explain ISI reduction techniques.
- b) What is RCF ? Explain with mathematical expression of transfer function of RCF.
7. a) Define spread spectrum modulation. Give the classification of spread spectrum. Draw and explain basic spread spectrum digital communication system.
- b) Explain FH – SS in detail with proper example.
8. a) Explain :
- i) Processing Gain.
 - ii) Jamming Margin.
 - iii) Application of spread Spectrum.
- b) Draw and explain DS-SS Transmitter and Receiver using BPSK.

Seat Number

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Mobile Communication (1100)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
 2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
 3. Students should note, no supplement will be provided.
 4. Solve **any five**. Each carries twenty marks.
 5. Draw a neat diagram whenever required.
 6. Assume suitable data whenever necessary.
1. a) How a cellular telephone call is made? Explain with timing diagram.
 - b) Explain frequency reuse concept in cellular network and state formula for N (Cells per cluster).
 2. a) What is cell splitting? Explain the significance of cell splitting.
 - b) Explain the frequency reuse concept in detail with proper schematic. What is the significance of no. of cell cluster, N.
 3. a) Explain the frame structure of GSM.
 - b) Explain various data services in GSM.
 4. a) What are Radio wave propagation issues in personal wireless system.
 - b) Explain Impulse Response Model of a Multipath Channel.

5. a) Explain different types of Antenna systems used in Mobile Radio.
b) What is the performance of Digital Modulation in Slow Flat-Fading Channel.
6. a) Explain non-linear Equalizer with the help of block diagram.
b) Explain four Space diversity reception methods.
7. a) Explain various frequency domain coding of speech.
b) What is Multiple Access? Explain FDMA system in detail.
8. a) Compare and contrast FDMA and TDMA systems.
b) Explain difference between Wireless and Fixed Telephone Networks.

Seat Number

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Advanced VLSI Design (1020)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
 2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
 3. Students should note, no supplement will be provided.
 4. Attempt **any five**. Each question carries equal marks.
 5. Draw well label diagram and assume suitable data whenever necessary.
1. a) Explain different modeling style in VHDL with example.
b) Write down a VHDL code for full adder using mixed modeling style.
 2. a) Explain signals and variables in VHDL coding with examples.
b) Draw and explain design flow for ASIC design.
 3. a) Explain Full Custom and Semi-Custom ASIC With schematic.
b) What is routing explain different types of routing in detail.
 4. a) Why FPGA is called as field programmable? Explain in detail.
b) Draw and explain 2 input NAND and NOR gate with truth tables.
 5. a) Write short notes on
 - i) Body effect
 - ii) Channel length modulation.
b) Draw the CMOS compound gate for the function $Y = (A.B) + (C.D)$ and explain with truth table.

6. a) Write short notes on
i) Static and Dynamic Characteristic
ii) Power Consumption in MOS.
- b) Explain in detail nWell CMOS fabrication process.
7. a) Draw and explain 2:1 Mux Inverter using transmission gates, also explain its advantages over other gates.
- b) Explain the processes of Lithography and oxidation.
8. a) Explain different second order effect in CMOS circuits.
- b) Write short notes w. r. t. CMOS on
i) Clocking strategies
ii) Power dissipation

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Communication System Design (1090)

P. Pages : 1

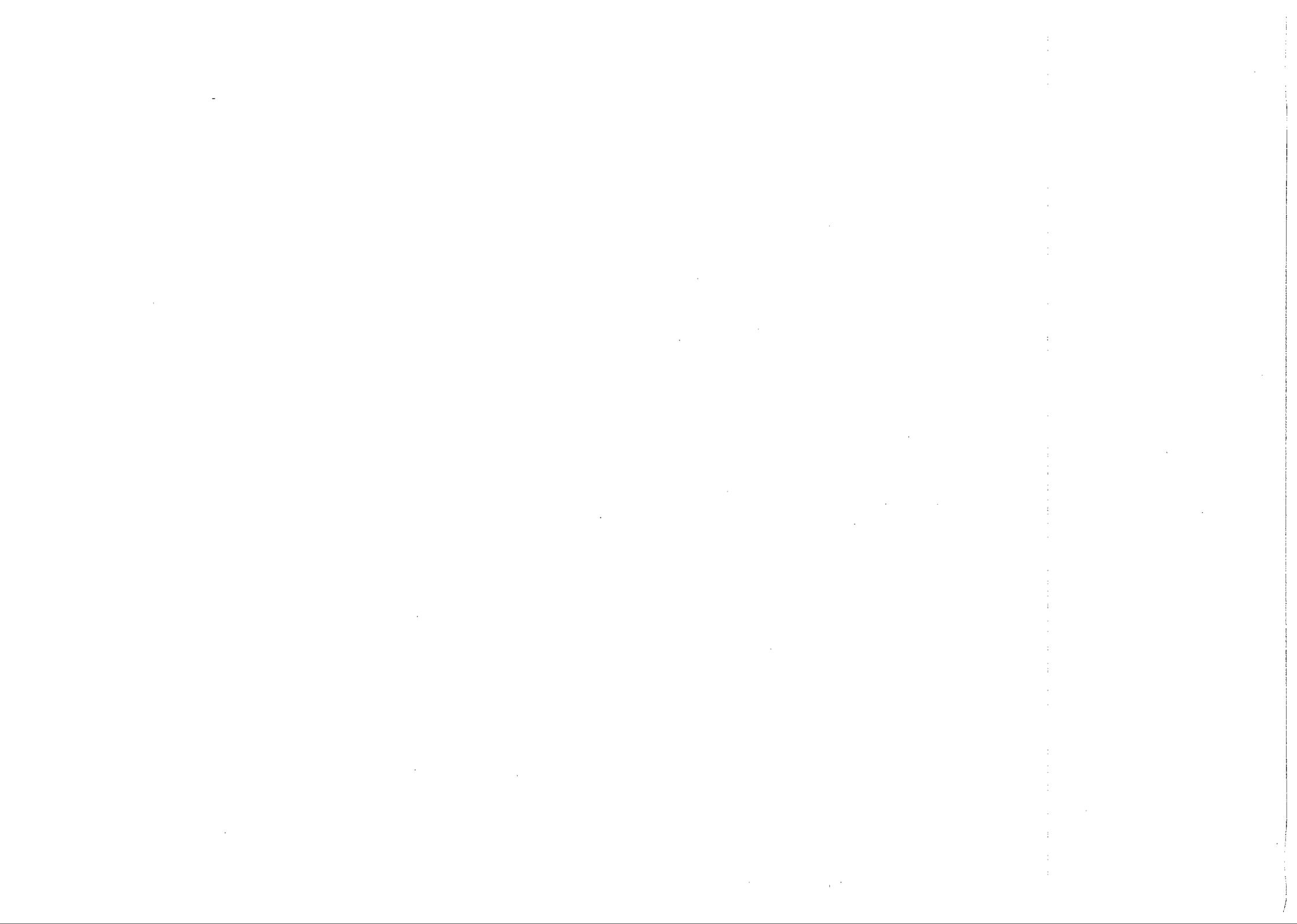
Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Solve **any five** question from the following.
5. Assume suitable data if necessary.
6. Draw neat diagram wherever required.

- | | | |
|----|---|----|
| 1. | a) Explain Q PSK modulation scheme in details. | 10 |
| | b) Explain the Friis equation. | 10 |
| 2. | a) Explain envelope fading The DECT uses GMSK with $BT_b=0.3$ & $\delta=0.68$ BER $(P_e)=10^{-3}$ find SNR. | 10 |
| | b) Write short note on "frequency & space diversity" | 10 |
| 3. | a) Explain general design philosophy to process the received signal. | 10 |
| | b) Explain image rejection filter. Also explain the image rejection problem in case of FDMA. | 10 |
| 4. | a) Explain the trade off between NF & power. | 10 |
| | b) Explain the matching network of LNA. | 10 |
| 5. | a) Explain unbalanced & single balance mixer. | 10 |
| | b) Explain Double balance mixer. | 10 |
| 6. | a) Explain FM Discriminator in detail. | 10 |
| | b) Explain the Design procedure for the designing of low pass sigma delta modulator. | 10 |
| 7. | a) Explain second order modulator. | 10 |
| | b) Explain multipath fading. | 10 |



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Advanced Digital Image Processing (1080)

P. Pages : 2

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with black ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Solve **any five** questions from 1 to 8.
5. Draw suitable diagrams wherever necessary.
6. Assume suitable data if necessary.
7. Figure to right indicates full marks.

1. a) What are the steps involved in DIP? Explain by drawing a block diagram. 10
- b) Give the conditions under which the D_4 distance between 2-point p and q is equal to the shortest 4-path between these points. Is this path unique? Justify your answer. 10
2. a) State and prove the properties of 2D fourier transform. 10
- b) State KL Transform and compute the co-variance matrix of vector population 'X' given as 10

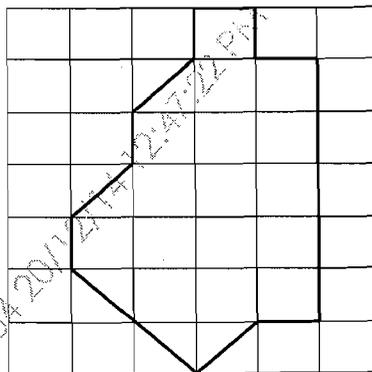
$$X_1 = (000)^T$$

$$X_2 = (100)^T$$

$$X_3 = (1\ 10)^T$$

$$X_4 = (1\ 0\ 1)^T$$
3. a) What is Hough transform? Give its properties in detail. 10
- b) Explain in detail Hadamard Transform. 10

4. a) Explain zerocrossing method of edge detection. 10
 b) Give steps of filtering in frequency domain and explain any two Filters in frequency domain. 10
5. a) Develop the Laplacian edge detector based mask operator. 10
 b) Explain greylevel interpolation in detail. 10
6. a) Explain lossy and lossless compression in detail. 10
 b) Write short note on. 10
 i) JPEG 2000 ii) MPEG.
7. a) What do you understand by dilation and erosion operator in morphological operation explain in brief. 10
 b) Explain following region based segmentation. 10
 1) region merging 2) region splitting.
 3) splitting and merging.
8. a) Write short note on chain code and give the 8-dimensional chain code for arbitrary shape shown. 10



- b) Explain the use of neural network in pattern recognition. 10
