Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)
1. What are the advantages of ADM system?
2. What are the commonly used compression laws in a compander?
3. Why coding of information is required?
4. If the input signal to matched filter is \( s(t) = \cos(\omega t) \). Find the impulse response of matched filter.
5. What is hamming distance? Mention its significance.
6. The generator matrix for (6,3) block code is \( G = \begin{bmatrix} 1 & 0 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 & 0 \end{bmatrix} \). Find code vector for message block \( (1,0,1) \).
7. Explain advantages of coherent over non coherent digital modulation schemes.
8. Compare M-ary PSK with M-ary QAM.
9. Define processing gain and explain its significance.
10. Write the merits of spread spectrum modulation.

PART – B (50 Marks)
11. a) Derive the overall signal to noise power ratio in a Delta Modulation system.
   b) Explain how adaptive delta modulation overcomes the problems of DM system.
12. a) Apply Shannon fano coding procedure for following message ensembles
    \( \{x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8\} \) with probability \( [P] = [1/4, 1/8, 1/16, 1/16, 1/4, 1/16, 1/8, 1/16] \).
    b) Explain binary symmetric channel and calculate mutual information for the channel.
13. a) What are code tree, code trellis and state diagrams for convolutional encoders?
    b) Write the error detection and error correction capabilities of Linear block codes.
14. a) Draw the block diagram of DPSK modulator and explain how synchronization problem is avoided for its detection.
    b) Explain non coherent detection of ASK signals and derive probability of error.
15 a) Discuss the frequency hopping spread spectrum technique in detail
   b) Explain the advantages and applications of spread spectrum modulation.

16 a) Explain Binary symmetric channel and calculate mutual information and
   channel capacity for the same.
   b) Calculate the capacity of low pass channel with a usable bandwidth of
      3000Hz and S/N = 1000 at the channel output. Assume the channel noise
      to be Gaussian and white.

17 a) In coherent binary PSK system the symbol probabilities are \( p(0 \text{ sent})=P \)
     and \( p(1 \text{ sent})=1-P \). The receiver is operating with a signal to
     noise ratio \( (A^2 T_b / \eta) = 4 \), \( \eta / 2 = 10^{-8} \), \( \eta_b = 10^6 \).
     Find the optimum
     threshold setting for \( P=0.4, 0.5 \) and 0.6 and find the probability of error
     \( P_e \) for \( p = 0.4, 0.5 \) and 0.6.
   b) Explain the demodulation techniques used in frequency hopped spread
      spectrum.
FACULTY OF ENGINEERING

B.E. 3/4 (ECE) II - Semester (Main) Examination, May 2016

Subject: Digital Signal Processing

Time : 3 hours

Max. Marks : 75

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART - A (25 Marks)

1. What are the similarities and differences between DIT and DIF radix-2 FFT algorithms?
2. Compute the DFT of a sequence \( x(n) = \{1, -1, 1, -1\} \) using DIT algorithm.
3. Differentiate linear convolution and circular convolution.
4. What are the properties of Chebyshev filter?
5. Explain the procedure for designing FIR filters using windows.
6. What are the advantages and disadvantages of FIR filters?
7. What is aliasing effect?
8. What is the modified Harvard architecture employed in digital signal processor?
9. What are the advantages of Kaiser window?
10. What is zero padding? Why is it needed?

PART - B (50 Marks)

11. a) Determine the stability for the following systems.
   i) \( h(n) = 0.2^n u(n) \)
   ii) \( h(n) = 4^n u(n) \)

   b) If a system is represented by the following difference equation
      \( y(n) = x(n) + nx(n+1) \)
      i) Is the system linear? Explain.
      ii) Is the system shift invariant? Explain.
      iii) Is the system causal? Explain.

12. Find the DFT of the following discrete time sequence \( x(n) = \{2, 1, 2, 1, 1, 2, 1, 2\} \)
    using radix-2 DIT FFT algorithm.

13. Design a digital low pass butterworth filter using bilinear transformation with \( T=1 \) sec
    with the following specifications.
    \[ 0.707 \leq |H(e^{j\omega})| \leq 1.0; \quad 0 \leq \omega \leq \frac{\pi}{2} \]
    \[ |H(e^{j\omega})| \leq 0.2; \quad \frac{3\pi}{4} \leq \omega \leq \pi \]

14. Design an ideal LPF whose desired frequency response is
    \[ H_d(e^{j\omega}) = 1; \quad \frac{\pi}{3} \leq \omega \leq -\frac{\pi}{3} \]
    \[ = 0; \quad \pi \geq |\omega| \geq -\frac{\pi}{3} \]
    Using Hanning window for \( N = 9 \).
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B.E. 3/4 (ECE) II – Semester (Main) Examination, May 2016
Subject: Antennas and Wave Propagation

Time: 3 hours

Max. Marks: 75

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1. Define retarded vector potential.

2. What is radiation resistance? Calculate the radiation resistance of a \( \pi/10 \) wire dipole in free space.

3. Estimate the gain of a paraboloid reflector antenna operating at 10 GHz, diameter 10m and illumination efficiency is 60%.

4. Compare the properties of antennas with standing wave and traveling wave current distribution.

5. Calculate half power beam width of 10 element end-fire array with interelement spacing of \( \pi/2 \).

6. What are different types of designs of rhombic antenna? Mention its disadvantage.

7. What are the disadvantages of lens antenna?

8. What is the E plane metal plate lens?

9. State the relation between critical frequency and electron density of an ionospheric layer.

10. Define critical frequency with neat sketch.

PART – B (50 Marks)

11 a) What is Lorentz guage condition? Show that

\[
\frac{\mathbf{E}}{\mathbf{B}} = \frac{\mathbf{F}}{\mathbf{E}} = \frac{\mathbf{1}}{\mathbf{1}}
\]

11 b) At what distance induction and radiation fields are equal?

12. Show the radiation resistance of half-wave dipole is 73 \( \Omega \).

13 a) With the necessary expression and show that the first side lobe level is -13.5 dB for uniformly excited array.

b) Draw the folded dipole antenna. Mention the two important advantages of folded dipole antenna.

14. What is a principle of helical antenna? Explain its axial and normal mode of operation.

15 a) Show that a parabolic dish antenna can produce a very narrow beam.

b) Explain the Cassegrain feeding of paraboloid reflector and its advantages.

16 a) Describe any one method to measure the gain of an antenna.

b) Show that the ionosphere acts as a medium of varying refractive index, by deriving necessary equations.

17 Write a short notes on:

a) Effect of Earth on vertical plane patterns

b) Horn antenna

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FACULTY OF ENGINEERING
B.E. 3/4 (EE/Inst.) II - Semester (Main) Examination, May 2016

Subject: Microprocessors and Micro Controllers.

Max. Marks: 75

Note: Answer all questions from Part-A and answer any five questions from Part-B.

PART – A (25 Marks)

1. State the use of segment registers in 8086 microprocessor. (2)
2. Give the difference between offset address and physical address. (3)
3. Explain the following directives: GROUP, PAGE. (3)
4. Write about macros. (2)
5. Give the control word format of Programmable Interval Timer. (3)
6. Draw the block diagram of Programmable Peripheral Interface. (2)
7. List the differences between microprocessor and microcontroller. (3)
8. Explain the Program Status Word of 8051 controller. (2)
9. List various interrupts of 8051 controller. (3)
10. Give the alternate functions of port 3 of 8051 controller. (3)

PART-B (50 Marks)

11. Explain in detail the architecture of 8086 microprocessor. (10)

12. (a) Write an assembly language program to multiply two 8-bit numbers using continuous addition method. (7)
    (b) Explain any three control transfer instructions of 8086. (3)

13. Explain using a flowchart, the interfacing of a keyboard using 8255 PPI with 8086. (10)

14. (a) Explain the block diagram of 8253 Timer. (4)
    (b) Discuss about various interrupts of 8086. (6)

15. Explain various addressing modes of 8051 controller with examples. (10)

16. (a) Give the details of port operations of 8051 controller. (7)
    (b) Explain the advantages of bit addressability in 8051 controller. (3)

17. (a) Discuss about memory mapping of 8051 controller. (6)
    (b) Give the differences between minimum and maximum modes of operation in 8086. (4)

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FACULTY OF ENGINEERING
B.E. 3/4 (ECE) II - Semester (Main) Examination, May 2016

Subject: Computer Organization and Architecture.

Time: 3 Hours

Max. Marks: 75

Note: Answer all questions from Part-A and answer any five questions from Part-B.

PART - A (25 Marks)

1. What is normalization and alignment in floating point arithmetic? 3M
2. Show the hardware for signed 2's complement addition and subtraction? 2M
3. Write the instruction formats for memory reference and register reference instructions. 3M
4. Explain LDA and STA instructions in general purpose computer. 3M
5. What are the different addressing modes of a basic computer? 3M
6. What are the advantages are of stack organized computer? 2M
7. Why handshake is required between CPU and I/O devices? 2M
8. Why does DMA have priority over the CPU when both request a memory transfer? 3M
9. Explain virtual address and physical address. 2M
10. What are Cache HIT and Cache MISS? 3M

PART-B (50 Marks)

11. a) Derive an algorithm in flowchart form for the non-restoring method of fixed point binary division. 6M
   b) Formulate a hardware procedure for detecting an overflow by comparing the sign of the sum with the signs of augend and addend. The numbers are in signed 2's complement representation. 4M

12. a) Explain various phases of an instruction cycle. 4M
    b) Draw the flowchart that explains the complete operation of how an instruction is fetched, decoded and executed in a computer. 6M

13. a) What is the purpose of micro program sequencer? Explain with a block diagram, how the sequencer presents address to control memory? 7M
    b) Write the need for addressing modes supported by general purpose computer. 3M

14. a) Mention the advantages of pipeline. 3M
    b) Draw a flow chart for a six stage CPU instruction pipeline and explain clearly. 4M
    c) What are the limitation of instruction level parallelism? 3M

15. a) Draw the block diagram of an asynchronous communication interface and explain its operation. 5M
    b) Explain interrupt priorities in detail with relevant figures. 5M

16. a) Explain read and write operations with respect to associative memory. 5M
    b) How many 512X8 RAM chips are needed to provide a memory capacity of 2048X16 2M
    c) Distinguish between SRAM and DRAM 3M

17. Write short notes on
   (a) Accumulator based CPU organization 4M
   (b) CPU-IOP communication 3M
   (c) Cache memory. 3M

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PART A (25 Marks)

1. What is the significance of “Limiting Error”? 
2. A moving coil meter has a uniform scale with 50 divisions and gives FSR of 5 A. The instrument can read up to $\frac{1}{4}$" of scale division with a fair degree of certainty. Determine the resolution of the instrument in mA. 
3. What is a transducer and how are they classified? 
4. Why resistance strain gauges used in pairs? And also list out the important precautions to be taken while using metallic wire strain gauges. 
5. Define “Sound Pressure Level” and “Sound Power Level”. 
6. Detail a typical application of a photo voltaic cell. 
7. List the advantages of DVMs over analog voltmeters. 
8. Distinguish between skin surface electrode and needle electrode. 
9. Explain the need for delayed time base oscilloscope. 
10. Explain the basic principle of operation of ultrasonic imaging system. 

PART B (5 x 10 = 50 Marks)

11 a) Enumerate the type of errors that are likely to occur in measurement and show how such errors can be minimized and evaluated. 
   b) Explain about various quality management standards. 

12 a) Describe the different modes of operation of Piezo-electric transducers. 
   b) Explain how rate of fluid flow is measured using a hot-wire anemometer. 

13 a) What method do you suggest to measure the level of molten metal at temperature of about 1500°C in a mould. Explain. 
   b) Distinguish between humidity and moisture. Explain different methods used for measurement of humidity. 

14 a) With a neat sketch, explain the operation of successive approximation type DVM. 
   b) Draw the block-diagram of Delayed-time base oscilloscope and explain its operation. 

15 a) What are resting and action potentials? Show the wave-form of action potentials and explain various mechanisms. 
   b) Compare ultrasonic and magnetic resonance imaging techniques. 

16 a) What is a microphone? Explain about the constructional details and principles of operation of different microphones. 
   b) Explain with neat diagram and necessary mathematical equations how a capacitance transducer can be used for thickness monitoring device. 

17 Write short notes on the following: 
   a) Elements of ISO 9001 
   b) SCADA 

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