

III B. Tech II Semester Regular Examinations, June-2022
WIRED AND WIRELESS TRANSMISSION DEVICES

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

UNIT-I

1. a) Derive the wave equation for a TE wave and mention dominant mode. [8M]
- b) Explain the losses of micro strip lines. [7M]

(OR)

2. a) A rectangular wave-guide has a cross section of $1.5 \text{ cm} \times 0.8 \text{ cm}$, $\sigma = 0$, $\mu = \mu_0$ and $\epsilon = 4\epsilon_0$. The magnetic field component is given as [8M]

$$H_x = 2 \sin\left(\frac{\pi x}{a}\right) \cos\left(\frac{3\pi y}{b}\right) \sin(\pi \times 10^{11} t - \beta z) \text{ A/m}$$

Determine:

- (i) The mode of operation
- (ii) The cut off frequency
- (iii) The phase constant
- (iv) The propagation constant
- (v) The wave impedance.
- b) Obtain the relation between phase velocity and group velocity. [7M]

UNIT-II

3. a) Define the half-power beam width and directivity of an antenna. And derive the relation between them. [8M]
- b) An antenna has a radiation resistance of 72Ω , a loss resistance of 8Ω and a power gain of 12 dB. Determine the antenna efficiency and its directivity. [7M]

(OR)

4. a) Draw the current distribution of an antenna with different lengths. [8M]
- b) Distinguish between directive gain and power gain. [7M]

UNIT-III

5. a) Derive the field components and radiation resistance of a half wave dipole. [8M]
- b) Find the radiation resistance of a loop antenna of diameter 0.5 m operating at a frequency of 1 MHz. [7M]

(OR)

6. a) What is linear array? Compare Broad side array and End fire array. [8M]
- b) What is binomial array antenna? What its basic principle of working? Mention the advantages and disadvantages. [7M]



UNIT-IV

7. a) Sketch and explain the constructional modes of a helical antenna. [8M]
b) Distinguish between resonant and non-resonant antennas. [7M]

(OR)

8. a) Explain about electromagnetic horn antenna. What are the [8M]
various types of horn and their practical applications?
b) Explain the various feeding mechanisms used in parabolic [7M]
reflector antennas.

UNIT-V

9. a) Classify the wave propagation based on frequency range. [8M]
b) Draw the block diagram of basic antenna measurement setup. [7M]
Explain each part.

(OR)

10. a) Derive the basic equation of free space propagation. [8M]
b) Explain how the E-H radiation patterns are measured. [7M]



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UNIT-I

1. a) Analyze the wave equation for a TE wave and all the field components in a rectangular wave guide. [8M]
b) Distinguish between the properties of TEM mode of propagation and that of TE and TM type of propagation. [7M]

(OR)

2. a) An air filled rectangular wave guide has dimensions of 0.9" × 0.4" and is supporting T E₁₀ mode at a frequency of 9800 MHz. Calculate the wave guide impedance. Calculate the percentage change in this impedance for a 10% increase in the operating frequency. [8M]
b) Derive the Characteristic impedance of a micro strip lines. [7M]

UNIT-II

3. a) What is meant by the effective area of an antenna? How is it related to the gain? [8M]
b) Explain the working principle of a 2-wire antenna? [7M]

(OR)

4. a) Explain the following: [8M]
(i) Beam area
(ii) Radiation intensity
(iii) Beam efficiency
(iv) Directivity.
b) Explain briefly radiation mechanism in single wire antenna. [7M]

UNIT-III

5. a) Discuss about loop antenna. What are the disadvantages of loop antenna? What are applications loop antennas? [8M]
b) Calculate the power gain of a half wave dipole whose ohmic losses and directive gain are 7 ohms and 1.64 respectively. [7M]

(OR)

6. a) What is uniform linear array? Discuss the application of linear array and also explain the advantages and disadvantage of linear array? [8M]
b) Explain the Half-Wavelength Folded Dipole. [7M]



UNIT-IV

7. a) Derive the construction and basic principles of operation of a helical antenna under [8M]
i) normal mode of operation
ii) axial mode of operation
b) Describe the working of microstrip antenna. List the advantages of microstrip antenna. [7M]

(OR)

8. a) What is optimum horn? Explain its important features with equations. [8M]
b) Explain the principle of working of lens antenna. [7M]

UNIT-V

9. a) Describe the troposphere and explain how ducts can be used for microwave propagation. [7M]
b) Briefly explain the terms: (i) LOS and Radio Horizon (ii) Effective Earth's radius. [8M]

(OR)

10. a) Discuss the basic characteristics of ground wave propagation. [8M]
b) What are the factors that affect the propagation of radio waves? [7M]



Code No: R1932041

R19

SET - 3

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Answer any **FIVE** Questions **ONE** Question from **Each unit**

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UNIT-I

1. a) Derive the expressions for cut off frequency, phase constant, group velocity, and phase velocity and wave impedance in rectangular waveguide, for TE modes. [8M]
- b) Explain about dominant and degenerate modes. Draw the sketches of TE and TM mode analysis [7M]

(OR)

2. a) Describe the method of designating the modes of transmission in rectangular waveguides. Why is transmission in the dominant mode most often used in waveguides? [8M]
- b) Show that the TEM, TM_{01} and TM_{10} modes does not exist in a rectangular waveguide. [7M]

UNIT-II

3. a) Derive the relation between directivity and effective aperture of an antenna. [8M]
- b) The radiation resistance of an antenna is 72Ω and loss resistance is 8Ω . What is the directivity in db if the power gain is 16? [7M]

(OR)

4. a) Explain the following terms: [8M]
 - (i) Beam width
 - (ii) Omni directional pattern
 - (iii) Side lobe level
 - (iv) Field pattern of antenna
- b) Explain the radiation from two-wire antenna. [7M]

UNIT-III

5. a) What is the radiation resistance of antenna? Derive the expression for radiation resistance of half wave length dipole antenna. [8M]
- b) Compare far fields of small loop antenna and short dipole antenna. [7M]



(OR)

6. a) Design Yagi-Uda antenna of 6 elements to provide gain of 12 dB [8M]
if the operating frequency is 200 MHz.
b) Explain the principal of pattern multiplication with an example. [7M]

UNIT-IV

7. a) Discuss advantages of microstrip antennas. Draw the radiation [8M]
characteristics of rectangular microstrip antenna.
b) Sketch and explain the construction, operation of a helical [7M]
antenna.

(OR)

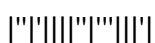
8. a) Illustrate the geometrical features of parabolic reflectors. List out [8M]
the advantages.
b) Explain the radiation characteristics of a pyramidal horn [7M]
antenna with neat diagrams. How is it different from other horn
antennas?

UNIT-V

9. a) Deduce an expression for the critical frequency of an ionized [8M]
region in terms of its maximum ionization density.
b) At what frequency a wave must propagate for the D-region to [7M]
have an index of refraction 0.5? Given $N = 400$ electron/c.c. for
D-region.

(OR)

10. a) Define Wave tilt of Ground Wave. Draw the equivalent circuit of [8M]
a ground.
b) Explain the 3-antenna method of measurement of the gain of a [7M]
horn antenna with necessary relations.

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R19

SET - 4

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Answer any **FIVE** Questions **ONE** Question from **Each unit**

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UNIT-I

1. a) Derive the wave equations for TM mode in Rectangular Wave guide. [8M]
b) Starting with the equation for the propagation constant of a mode in a rectangular wave guide, Derive the expression $\lambda = \frac{\lambda_g \lambda_c}{\lambda_g^2 + \lambda_c^2}$, where λ_g is the guide wave length and λ_c is the cutoff wave length. [7M]

(OR)

2. a) Determine the group velocity and phase velocity for a dominant mode propagating through a waveguide of breadth 10 cm at frequency 2.5 GHz. [8M]
b) Explain the importance of Q-factor estimation in microstrip lines. [7M]

UNIT-II

3. a) What are principle planes? How the antenna beam width is defined in such planes? [8M]
b) An antenna has a loss resistance 10 ohms, power gain of 20 and directivity 22, calculate its radiation resistance. [7M]

(OR)

4. a) Define the terms: [8M]
(i) Bandwidth
(ii) Polarization
(iii) Effective aperture area.
b) Draw the equivalent circuit of an antenna. How the EM fields are detached from an antenna? Explain. [7M]

UNIT-III

5. a) Derive the expression for far field components of a small loop antenna. [8M]
b) Derive the expression for effective area and effective height of dipole antenna. [7M]



(OR)

6. a) Derive the expression for array factor of a linear broadside array of N isotropic elements. [8M]
b) Find the array factor and plot the normalized radiation pattern of a broadside array of 5 isotropic radiators of spacing $\lambda/2$. [7M]

UNIT-IV

7. a) Discuss various feeding techniques of microstrip antenna. Also list any five applications of patch antennas. [8M]
b) Write short notes on travelling wave antenna. Explain various types of travelling wave antennas. [7M]

(OR)

8. a) Explain the characteristics of 90° corner reflector with the help of image principle. [8M]
b) Write short notes on lens antenna. Discuss different types of lens antennas with neat sketches. [7M]

UNIT-V

9. a) Derive the LOS distance equation in space wave propagation. [8M]
b) Explain about directivity measurement procedure of a given test antenna. [7M]

(OR)

10. a) Derive the field strength equation at receiving antenna in space wave propagation technique. [8M]
b) List different sources of errors in antenna measurements. [7M]



III B. Tech II Semester Supplementary Examinations, June-2022
MICROPROCESSORS AND MICROCONTROLLERS

(Common to ECE, EIE, E.COM.E)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answer **ALL** the question in **Part-A**
 3. Answer any **FOUR** Questions from **Part-B**
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PART –A**(14 Marks)**

1. a) Difference between Maximum and Minimum modes of 8086 Microprocessor. [2M]
- b) Write any Two addressing modes of 8086 Microprocessor. [2M]
- c) Write the silent features of 8259. [2M]
- d) What is Segmentation in 80386? [3M]
- e) What is need of Interrupt service routine? [3M]
- f) List out PIC microcontroller families. [2M]

PART –B**(56 Marks)**

2. a) Explain the Maximum mode operation of 8086 with the help of timing diagram. [7M]
- b) What is Memory segmentation? List out its advantages. [7M]
3. a) Write an ALP for 8086 to transfer 10 bytes of data from one location to another location. [7M]
- b) Define the String manipulation instructions with examples. [7M]
4. a) How to interface A/D converter with 8086 microprocessors illustrate with an example. [7M]
- b) Explain different control word formats of 8255 PPI. [7M]
5. a) Explain the Paging mechanism in 80386 Microprocessor. [7M]
- b) Discuss the Register organization of 80386 Microprocessor. [7M]
6. a) Explain about the architecture of 8051 microcontroller in detail. [7M]
- b) Describe the different modes of operation of timers/counters in 8051. [7M]
7. a) Discuss memory organization of PIC microcontroller. [7M]
- b) Draw and explain different timers present in the PIC microcontroller. [7M]



III B. Tech II Semester Supplementary Examinations, June-2022
MICROPROCESSORS AND MICROCONTROLLERS
 (Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

PART –A

(22 Marks)

1. a) Write short notes on flag register of 8086. [3M]
- b) Explain the following assembler directives of 8086 microprocessor: [4M]
(i) ASSUME (ii) SEGMENT (iii) EQU (iv) DB
- c) Draw and discuss the mode set register of 8257. [4M]
- d) Differentiate real and protected modes of 80386. [4M]
- e) Discuss the following SFRs in 8051: (i) SCON (ii) TCON [4M]
- f) Explain Load instructions of ARM7 with one example. [3M]

PART –B

(48 Marks)

- | | | | |
|----|----|---|------|
| 2. | a) | What do you mean by addressing modes? What are the different addressing modes supported by 8086? | [8M] |
| | b) | Draw the complete block diagram of 8086 architecture. Explain the functions of BIU and EU. | [8M] |
| 3. | a) | Draw and discuss the interrupt vector table of 8086 microprocessor. | [8M] |
| | b) | Write an 8086 program to convert a BCD byte into a binary number. | [8M] |
| 4. | a) | Explain interfacing I/O subsystem using an 8255 with one example. | [8M] |
| | b) | Draw the interfacing diagram of 8259 PIC to 8086 microprocessor. | [8M] |
| 5. | a) | List out the salient features of 80386DX also give the major architectural advancements in 80386 over 8086. | [8M] |
| | b) | Discuss the register set of 80386 and explain the typical function of each of the registers in brief. | [8M] |
| 6. | a) | Draw and discuss the formats and bit definitions of the following SFRs in 8051 microcontroller. | [8M] |
| | b) | Write code to push R0, R1 and R3 of bank 0 into the stack and pop them back into R5, R6 and R7 of bank 3 of 8051. | [8M] |
| 7. | a) | Explain about the memory organization of PIC microcontroller. | [8M] |
| | b) | Draw a neat block diagram and pin out diagram of ARM7, and explain each pin. | [8M] |

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III B. Tech II Semester Regular Examinations, June-2022

DIGITAL SIGNAL PROCESSING

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

UNIT-I

1. a) Define periodic signal. Determine periodicity of the following signals: [8M]

(i) $x(n) = \cos^2\left(\frac{\pi}{8}n\right)$ (ii) $x(n) = \cos\left(\frac{\pi}{3}n\right) + 3\sin\left(\frac{\pi}{4}n\right)$

- b) Find the step response of a discrete-time LTI system whose difference equation is given by [7M]

$$y(n) = y(n-1) + 0.5y(n-2) + x(n) + x(n-1)$$

(OR)

2. a) Define and explain the following systems with an example: [8M]

(i) Causal and non-causal (ii) Time-invariant and time-variant

- b) Find the magnitude and phase response of the LTI system with [7M]

$$h(n) = \delta(n) - \delta(n-1)$$

UNIT-II

3. a) Determine the discrete Fourier series coefficients of the periodic signal $x(n) = \left(\cos\frac{2\pi}{3}n\right)\left(\sin\frac{2\pi}{5}n\right)$. Also, sketch its magnitude spectrum. [8M]

- b) How FFT algorithm improves the speed of computation? Explain with an example. [7M]

(OR)

4. a) State and prove any two properties of DFT. [8M]

- b) Find the 4-point DFT of the sequence $x(n) = \{2, 1, 4, 3\}$ by using DIF FFT algorithm? Also, plot its magnitude and phase spectra. [7M]

UNIT-III

5. a) Obtain the 4th order transfer function of normalized Butterworth low pass filter. [8M]

- b) Draw the parallel form realization of a system with system function [7M]

$$H(z) = \frac{(1 - z^{-1})^3}{\left(1 - \frac{1}{2}z^{-1}\right)\left(1 - \frac{1}{8}z^{-1}\right)}$$

(OR)

6. a) Design a digital Butterworth band pass filter using bilinear transformation for the following specifications: [10M]
 Lower stop band edge = 25 Hz; Lower pass band edge = 100 Hz;
 Upper pass band edge = 150 Hz; Upper stop band edge = 225 Hz;
 Stop band attenuation = 18 dB; Pass band ripple = 3 dB;
 Sampling frequency = 500 Hz.
- b) List out the requirements for conversion of stable analog filter into stable digital filter. [5M]

UNIT-IV

7. a) Determine the frequency response of FIR filter with N is odd and symmetric impulse response. [8M]
 b) Explain the concept of Gibbs phenomenon in FIR filters. [7M]

(OR)

8. a) The desired frequency response of a high pass filter is [8M]

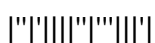
$$H_d(e^{j\omega}) = \begin{cases} 0, & \text{for } 0 \leq |\omega| \leq \frac{3\pi}{4} \\ e^{-j3\omega}, & \text{for } \frac{3\pi}{4} \leq |\omega| \leq \pi \end{cases}$$

Determine the filter coefficients for $N=7$ using Hamming window.

- b) Distinguish between FIR and IIR filters. [7M]
- UNIT-V**
9. a) Write a short notes on the following: [8M]
 (i) Multiple access memory (ii) Multiported memory
 b) Explain the instruction set of Cortex-M processors. [7M]

(OR)

10. a) Explain the short direct addressing and circular addressing modes in programmable DSP's. [8M]
 b) Discuss the processor type in ARM Cortex-M processors. [7M]



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UNIT-I

1. a) Determine the causality and stability of following systems with impulse responses: [8M]
 (i) $h(n) = 3^n u(-n)$ (ii) $h(n) = e^{2n} u(n-1)$
 b) Define and explain the following discrete-time signals with necessary mathematical expressions: [7M]
 (i) Periodic and Aperiodic (ii) Energy and power
- (OR)
2. a) State and prove the frequency shifting property of DTFT. [7M]
 b) Determine the response of the following system described by a difference equation [8M]

$$y(n) = x(n) + \frac{5}{6}y(n-1) - \frac{1}{6}y(n-2)$$

$$\text{for the input } x(n) = \begin{cases} 3^n & \text{for } n \geq 0 \\ 0 & \text{for } n < 0 \end{cases}$$

UNIT-II

3. a) The $IDFT[X(k)] = x(n) = \{1, 2, 1, 0\}$, find the following by use of DFT properties: [7M]
 (i) $IDFT[X(k-1)]$ (ii) $IDFT[X^2(k)]$
 b) Explain the procedure to compute 8-point DFT using DIT FFT algorithm. [8M]

(OR)

4. a) Distinguish between linear convolution and circular convolution. [7M]
 b) Find the 4-point IDFT of $X(k) = \{10, -2 + j2, -2, -2 - j2\}$ using DIF FFT algorithm. [8M]

UNIT-III

5. a) Find $H(z)$, for a 3rd order Butterworth digital filter using impulse invariant transformation method. Assume $T = 1$ sec. [8M]
 b) Obtain the cascade and parallel form realization of IIR filter with system function [7M]

$$H(z) = \frac{1}{1 + 2z^{-1} - z^{-2}}$$



(OR)

6. a) Design a digital band stop Butterworth filter using bilinear transformation for the following specifications. [10M]
 Lower pass band edge = 25 Hz; Lower stop band edge = 100 Hz;
 Upper stop band edge = 150 Hz; Upper pass band edge = 225 Hz;
 Stop band attenuation = 18 dB; Pass band ripple = 3 dB;
 Sampling frequency = 500 Hz.
- b) What is meant by canonic and non-canonic structures? Give an example. [5M]

UNIT-IV

7. a) Obtain the frequency domain characteristics of rectangular window function. [8M]
- b) The desired frequency response of a low pass filter is [7M]

$$H_d(e^{j\omega}) = \begin{cases} e^{-j3\omega} & , \quad \text{for } -\frac{3\pi}{4} \leq |\omega| \leq \frac{3\pi}{4} \\ 0 & , \quad \text{for } \frac{3\pi}{4} \leq |\omega| \leq \pi \end{cases}$$

Design an FIR filter using Hamming window of length $N = 7$.

(OR)

8. a) List out the steps involved in design of FIR filter using frequency sampling method. [8M]
- b) Sketch the direct form realization of linear phase FIR filter with [7M]
 $h(n) = \{1, 2, 3, 4, 3, 2, 1\}$

UNIT-V

9. a) How convolution operation is performed using a single MAC unit? Explain. [8M]
- b) Explain the processor architecture of Cortex-M3 processor. [7M]

(OR)

10. a) List out the on-chip peripherals in programmable DSP's and explain any two of them in detail. [8M]
- b) What are the advantages of Cortex-M processor? [7M]



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UNIT-I

1. a) Define time invariant system. Determine the following systems [8M]
are time invariant or not:
(i) $y(n) = x(n) + nx(n+1)$ (ii) $y(n) = x(3n)$
b) How to solve the linear constant coefficient difference equation [7M]
using Z-transforms approach? Explain.

(OR)

2. a) Find the discrete time Fourier transform of a signal given by [7M]

$$x(n) = \left(\frac{1}{2}\right)^{|n-1|}$$

- b) Determine the frequency response and impulse response of the [8M]
discrete-time system represented by the difference equation

$$y(n) - y(n-1) + \frac{3}{16}y(n-2) = x(n) - \frac{1}{2}x(n-1)$$

UNIT-II

3. a) State and prove the time-shifting and symmetry properties of [8M]
discrete Fourier series.
b) Find N-point DFT of a sequence [7M]

$$x(n) = \cos\left(\frac{2\pi rn}{N}\right), 0 \leq n \leq (N-1) \text{ and } 0 \leq r \leq (N-1)$$

(OR)

4. a) The $DFT[x(n)] = X(k) = \{4, -j2, 0, j2\}$, compute the following by use [7M]
of DFT properties:
(i) $DFT[x(n-2)]$ (ii) $DFT[x^*(n)]$
b) Develop a radix-2 DIT FFT algorithm for evaluating 4-point DFT. [8M]
Also draw its flow diagram.

UNIT-III

5. a) Design a digital Chebyshev low pass filter to satisfy the following [8M]
constraints:

$$0.8 \leq |H(e^{j\omega})| \leq 1, \quad 0 \leq \omega \leq 0.2\pi$$

$$|H(e^{j\omega})| \leq 0.2, \quad 0.6\pi \leq \omega \leq \pi$$

using impulse invariant transformation and assume $T = 1$ sec.

- b) Explain the concept of frequency transformation in analog [7M]
domain with necessary mathematical expressions.

(OR)

6. a) Obtain the bilinear transformation formula for designing IIR [8M]
digital filter?
b) Draw the direct form I and direct form II structures of the [7M]
system with difference equation

$$y(n) = -\frac{3}{8}y(n-1) + \frac{3}{32}y(n-2) + \frac{1}{64}y(n-3) + x(n) + 3x(n-1)$$

UNIT-IV

7. a) Design a high pass FIR filter using Hamming window with a [8M]
cutoff frequency of 1.2 rad and $N = 9$.
b) Obtain the ideal impulse response of a high pass FIR filter. [7M]

(OR)

8. a) Derive the necessary and sufficient condition for linear phase [8M]
characteristic in FIR filter.
b) Explain the procedure for designing of an FIR filter using [7M]
frequency sampling method.

UNIT-V

9. a) Draw the block diagram of VLIW architecture and explain. [8M]
b) Explain the memory system related to Cortex-M3 and M4 [7M]
processors.

(OR)

10. a) Explain the memory mapped addressing modes and bit reversed [8M]
addressing modes in programmable DSP's.
b) Write a short note on the instruction set of Cortex-M processors. [7M]

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UNIT-I

1. a) What is meant by BIBO stable system? Derive its necessary and sufficient condition. [7M]
- b) Solve the following difference equation using Z-transform [8M]

$$y(n) + 2y(n-1) = x(n)$$
with $x(n) = (1/3)^n u(n)$ and the initial condition $y(-1) = 1$.

(OR)

2. a) Check whether the following systems are linear or not. [8M]
(ii) $y(n) = |x(n)|$ (ii) $y(n) = \sum_{k=0}^{N-1} x(n-k)$
- b) A unit sample response of a discrete time system is given by [7M]

$$h(n) = \frac{1}{2}\delta(n) + \delta(n-1) + \frac{1}{2}\delta(n-2)$$

Determine the frequency response of a system and also sketch its magnitude and phase spectra.

UNIT-II

3. a) Determine and sketch the magnitude and phase spectra of the periodic signal, $x(n) = \{1, 1, 0, 0\}$ with period $N = 4$. [8M]
- b) State and prove the periodicity and circular time shifting properties of DFT. [7M]

(OR)

4. a) Find the circular convolution of given two sequences using DFT and IDFT. $x_1(n) = \{1, 2, 3, 4\}$ and $x_2(n) = \{1, 1, 2, 2\}$. [8M]
- b) What is the importance of FFT? Explain with an example. [7M]

UNIT-III

5. a) Design a digital Chebyshev low pass filter using bilinear transformation with the following specifications: [8M]
3 dB ripple in the pass band $0 \leq \omega \leq 0.2\pi$;
25 dB attenuation in the stop band $0.45\pi \leq \omega \leq \pi$;
Assume $T = 1$ sec.
- b) Explain the transposed form structures with an example. [7M]



(OR)

6. a) Distinguish between Butterworth and Chebyshev filters. [7M]
 b) What are the advantages of parallel form realization? Implement the IIR filter with difference equation [8M]

$$y(n) = -0.1y(n-1) + 0.72y(n-2) + 0.7x(n) - 0.252x(n-2)$$
 in parallel form.

UNIT-IV

7. a) Design an FIR digital filter to approximate an ideal low pass filter with pass band gain of unity, cut-off frequency of 850 Hz and sampling frequency of 5000 Hz. The length of impulse response should be 5. Use rectangular window. [8M]
 b) Obtain the direct form realization of linear phase FIR filter with system function [7M]

$$H(z) = \frac{1}{2} + \frac{1}{3}z^{-1} + z^{-2} + \frac{1}{4}z^{-3} + z^{-4} + \frac{1}{3}z^{-5} + \frac{1}{2}z^{-6}$$

(OR)

8. a) Explain the frequency domain characteristics of various window functions used in FIR filter design. [7M]
 b) The desired frequency response of a low pass filter is [8M]

$$H_d(e^{j\omega}) = \begin{cases} e^{-j8\omega} , & \text{for } 0 \leq |\omega| \leq \frac{\pi}{2} \\ 0, & \text{for } \frac{\pi}{2} \leq |\omega| \leq \pi \end{cases}$$

Design an FIR filter with $N = 17$ using frequency sampling method.

UNIT-V

9. a) What is meant by instruction pipelining? Explain with an example. [8M]
 b) Explain the differences between Von Neumann and Harvard architectures. Which architecture is preferred for DSP applications? [7M]

(OR)

10. Draw the block diagram of Cortex-M3 and Cortex-M4 processor? Explain. [15M]



III B. Tech II Semester Supplementary Examinations, June-2022**VLSI DESIGN****(Common to ECE, EIE, E.COM.E)**

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answer **ALL** the question in **Part-A**
 3. Answer any **FOUR** Questions from **Part-B**
- ~~~~~

PART –A**(14 Marks)**

1. a) What is Body effect? [2M]
- b) What is Layout Diagram? What are the uses of Layout diagram? [3M]
- c) Derive the scaling factor for gate capacitance C_g ? [2M]
- d) What is ESD protection? [3M]
- e) Define LUT. [2M]
- f) How static power dissipation is different from dynamic power dissipation? [2M]

PART –B**(56 Marks)**

2. a) Derive the CMOS inverter DC characteristics and obtain the relationship for output voltage at different region in the transfer characteristics. [7M]
- b) What is Moore's law? Explain its relevance with respect to evolution of technology? [7M]
3. Explain the following [14M]
 - (i) Double metal MOS process rules
 - (ii) Design rules for p-well CMOS process
4. a) How the capacitive load effects the operation of the amplifier circuits? Explain. [7M]
- b) Describe three sources of wiring capacitances. Explain the effect of wiring capacitance on the performance of a VLSI circuits. [7M]
5. a) Why testing is needed and explain the categories for testing. [7M]
- b) What are the issues to be considered while implementing BIST? Explain. [7M]
6. a) Explain the step-by-step procedure to implement half adder circuit using FPGA. [7M]
- b) What is the purpose of 'constraints' in synthesis process? Explain. [7M]
7. a) With a neat sketch, explain about deep submicron digital IC design. [7M]
- b) Briefly discuss about scaling limitation for low voltage, low power design. [7M]

III B. Tech II Semester Regular Examinations, June-2022

INTERNET OF THINGS

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

UNIT-I

1. a) Define IoT. Explain the role of things and internet in IoT. [8M]
b) What are the major layers in IoT Architecture? [7M]

(OR)

2. a) Explain the advantages and disadvantages of an IoT. [8M]
b) Explain the role of cloud in IoT. [7M]

UNIT-II

3. a) Explain Arduino. What are the things need to be considered for developing on the Arduino? [8M]
b) What are the Advantages of the ARM Cortex-M0 Processor? [7M]

(OR)

4. a) Give a detailed overview of the ARM Processor families. [8M]
b) What is the difference between x86, ARM and Intel processors? [7M]

UNIT-III

5. a) Explain the benefits of using Python programming language in IoT. [8M]
b) Explain the role of UDP and MAC Address in IOT. [7M]

(OR)

6. a) Explain the constraint application protocol (CoAP). [8M]
b) Draw and explain Bluetooth Low Energy architecture. [7M]

UNIT-IV

7. a) What is device integration? Explain its implementation. [8M]
b) Write key points about unstructured data storage on cloud. [7M]

(OR)

8. a) Why is device authentication necessary for the IoT? [8M]
b) Explain about authorization of devices. [7M]

UNIT-V

9. a) What are the elements of a home automation system? [8M]
b) Define how the IoT technology can be implemented in smart lightening. [7M]

(OR)

10. a) Implement Remote medical assistance. [8M]
b) Define how the IoT technology can be implemented in fire detection. [7M]



Code No: R1932044

R19

SET - 2

III B. Tech II Semester Regular Examinations, June-2022

INTERNET OF THINGS

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

UNIT-I

1. a) What is internet of things? Describe the characteristics of IoT. [8M]
b) Explain working of IoT gateways. [7M]

(OR)

2. a) State and explain M2M communication with example. [8M]
b) Explain in detail about XaaS (Everything as a Service). [7M]

UNIT-II

3. a) Describe the procedure of building IoT with Raspberri Pi. [8M]
b) Why we need various types of processors? [7M]

(OR)

4. Draw the functional block diagram of ARM Cortex-M0 processor and explain each block. [15M]

UNIT-III

5. a) List and explain some python packages of interest for IoT. [8M]
b) Give the brief introduction about Internet Protocol (IP), TCP. [7M]

(OR)

6. a) What is ZigBee? Explain. [8M]
b) List Bluetooth key versions. What are the difficulties associated with them. [7M]

UNIT-IV

7. a) What do you mean by data storage? What are the different schemas for a data store? [8M]
b) Discuss data acquiring and storage. [7M]

(OR)

8. a) Explain the usage of cloud platforms for IoT applications and services. [8M]
b) Why is device authentication necessary for the IoT? [7M]

UNIT-V

9. a) Define how the IoT technology can be implemented in intrusion detection system. [8M]
b) Define how the IoT technology can be implemented in industrial automation with any example. [7M]

(OR)

10. a) Implement the smart irrigation system. [8M]
b) Determine the IoT levels for designing structural health monitoring system. [7M]



Code No: R1932044

R19

SET - 3

III B. Tech II Semester Regular Examinations, June-2022

INTERNET OF THINGS

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

UNIT-I

1. a) What are the design principles of IoT? Explain. [8M]
- b) What are examples of IoT devices? Explain. [7M]

(OR)

2. a) With the help of neat diagram, describe the levels of IoT with an example each. [8M]
- b) Explain various Business Model Patterns in the IoT. [7M]

UNIT-II

3. a) What are the things need to be considered for developing on the Raspberri Pi? [8M]
- b) What is Special About the ARM Ecosystem? [7M]

(OR)

4. Give an overview of ARM Cortex-M Processor family. [15M]

UNIT-III

5. a) Give the brief introduction about Internet Protocol (IP), TCP. [8M]
- b) Why the python is the first choice for the Raspberry Pi language than C or C++? [7M]

(OR)

6. a) Explain with example MQTT protocol. What is the role of MQTT protocol in IoT? [8M]
- b) Which protocol is used to link all the devices in IoT? Explain in detail. [7M]

UNIT-IV

7. a) Discuss data acquiring and storage. [8M]
- b) Write key points about unstructured data storage on cloud. [7M]

(OR)

8. a) How authentication and authorization of devices is achieved? [15M]

UNIT-V

9. a) Define how the IoT technology can be implemented in industrial automation with any example. [8M]
- b) Explain the implementation of Heart Monitors with Reporting. [7M]

(OR)

10. a) Explain service specification and information model for Home Intrusion Detection system using IoT Design Methodology. [8M]
- b) Explain the implementation of IoT technology in smart parking. [7M]



Code No: R1932044

R19

SET - 4

III B. Tech II Semester Regular Examinations, June-2022

INTERNET OF THINGS

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

UNIT-I

1. a) Mention the applications of IoT. [8M]
b) Explain the role of things in IoT. [7M]

(OR)

2. a) Define IoT and M2M. Illustrate the differences between IoT and M2M. [8M]
b) What are the major privacy and security issues in case of IoT? [7M]

UNIT-II

3. a) Explain in detail about ARM Cortex-A class processor. [8M]
b) Give the difference between Arduino and Raspberry Pi. [7M]

(OR)

4. a) What are the key characteristics of the ARM Cortex-M0? [8M]
b) Explain Cortex-M0 Processor Instruction Set. [7M]

UNIT-III

5. a) What are the advantages and disadvantages of Bluetooth? [8M]
b) Explain TCP/IP protocol suite with diagram. [7M]

(OR)

6. a) Write a short note on: MQTT, CoAP, ZigBee. [8M]
b) Write a Python program for blinking an LED. [7M]

UNIT-IV

7. a) What do you mean by data storage? What are the different schemas for a data store? [8M]
b) Write key points about unstructured data storage on cloud. [7M]

(OR)

8. a) How authentication and authorization of devices is achieved. [15M]

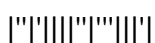
UNIT-V

9. a) Implement the smart irrigation system. [8M]
b) Design process specification and domain for home intrusion detection system using IoT design methodology. [7M]

(OR)

10. a) Explain the implementation of IoT technology in Structural health monitoring. [8M]
b) Discuss about case study on IoT system for industrial automation. [7M]





III B. Tech II Semester Supplementary Examinations, June-2022

MICROWAVE ENGINEERING

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

PART –A**(22 Marks)**

1. a) List out the microwave frequency bands. [3M]
b) Write short notes on characteristic impedance of microstrip lines [4M]
c) Write short notes on Gyrator. [4M]
d) What is transit angle? How it influence the performance of conventional tubes at higher frequencies? [4M]
e) What is meant by crossed-field tube? Explain. [4M]
f) Write the performance characteristics of IMPATT diode. [3M]

PART –B**(48 Marks)**

2. a) Explain about power losses in rectangular waveguide. [8M]
b) Discuss about cutoff wave number, phase constant and wave impedance in a rectangular waveguide. [8M]
3. a) What is cavity resonator? Discuss the fundamentals of circular cavity resonator. [8M]
b) Derive the expression for Q-factor of a cavity resonator. [8M]
4. a) Draw the H-plane Tee and derive the scattering matrix of it. [8M]
b) What is circulator? Explain its operation and write the applications. [8M]
5. a) Explain bunching process in two cavity klystron amplifier. [8M]
b) Draw the schematic diagram of reflex klystron and explain its operation. [8M]
6. a) Draw the diagram of helix travelling wave tube and explain its operation. [8M]
b) Derive the Hull cutoff voltage equation in a cylindrical magnetron. [8M]
7. a) Explain the operation of TRAPATT diode with necessary waveforms. [8M]
b) Define VSWR and explain the procedure for measurement of it. [8M]



III B. Tech II Semester Regular Examinations, June-2022

CELLULAR & MOBILE COMMUNICATION

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

UNIT-I

1. a) Explain the different components of a cellular system. [8M]
b) Explain the need for cell splitting. Also explain two kinds of cell splitting techniques. [7M]

(OR)

2. a) Explain the significance of delay spread and coherence bandwidth in mobile radio environment due to multipath reflection phenomenon. [8M]
b) If an average calling time is 1.76 min and maximum calls per hour in one cell be 3000, find the offered load in erlangs. [7M]

UNIT-II

3. a) Define co-channel Interference. Explain about co-channel interference reduction factor. [8M]
b) Discuss the design of an omni directional antenna system in $k = 7$ cell pattern when the mobile unit is at the cell boundary. [7M]

(OR)

4. a) Diversity scheme applied at the receiving end of the antenna is an effective technique for reducing interference. Justify. [8M]
b) What are different types of non-co-channel interference in a cellular system? [7M]

UNIT-III

5. a) Explain about paging channels. [8M]
b) Discuss the effects of human made structures on cell coverage. [7M]

(OR)

6. a) Explain the methods of channel assignment to the mobile units in detail. [8M]
b) In a mobile radio environment, the average cell-site antenna height is about 50 m, the mobile antenna height is about 3 m, and the communication path length is 5 km. Find [7M]
(i) Incident angle
(ii) Elevation angle at the antenna of the mobile unit



UNIT-IV

7. a) Explain in detail the need for hand off and determine the probability of requirement of hand off. [8M]
b) Write short notes on [7M]
(i) Mobile assisted handoff
(ii) Intersystem handoff

(OR)

8. a) Explain soft and hard handoffs. [8M]
b) What is meant by a dropped call? Explain the factors that influence the dropped call rate. [7M]

UNIT-V

9. a) With suitable block diagram explain the GSM system. [8M]
b) Discuss the salient features of FDMA and TDMA techniques. [7M]

(OR)

10. a) What is TDMA? Explain TDMA architecture with neat diagram. [8M]
b) Explain the capabilities and applications of 5G communications. [7M]



III B. Tech II Semester Regular Examinations, June-2022

CELLULAR & MOBILE COMMUNICATION

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

UNIT-I

1. a) Why the shape of a cell is represented with hexagon? Explain with an example. [8M]
b) Explain the significance of frequency reuse in cellular systems. [7M]

(OR)

2. a) Illustrate the modeling of transmission medium in mobile radio environment. [8M]
b) During a busy hour, the number of calls per hour for each of 10 cells is 2000, 1500, 3000, 500, 1000, 1200, 1800, 2500, 2800, 900. Assume that 60 percent of the car phones will be used during this period and that one call is made per car phone, Calculate the total allowed subscriber traffic in the system. [7M]

UNIT-II

3. a) Describe how to find the cochannel interference area from a mobile receiver. [8M]
b) Explain the occurrence of near end far end interference in the following cases: [7M]
(i) One cell (ii) Cells of two systems

(OR)

4. a) Discuss the method of finding C/I ratio in a directional antenna system for 3-sector case in 7-cell reuse pattern. [8M]
b) Derive C/I from a normal case in a omnidirectional antenna system. [7M]

UNIT-III

5. a) Explain the process of selecting a voice channel for: [8M]
(i) Mobile originating calls (ii) Paging calls
b) Explain the concept of overlaid cells with neat diagrams. [7M]

(OR)

6. a) Explain the process of numbering and grouping the channels. [8M]
b) Explain the concept of point-to-point model and its merits. [7M]



UNIT-IV

7. a) How can handoff be initiated at the boundary of two cells, based upon threshold point considering signal at two base stations. [8M]

b) Explain about intersystem and intra system handoffs. [7M]

(OR)

8. a) Queuing of handoffs is more effective than two threshold level handoffs. Justify. [8M]

b) Explain various vehicle locating methods. [7M]

UNIT-V

9. a) What are the channel types of GSM system? Explain [8M]

b) What problems does OFDMA solve? How does OFDMA work? [7M]

(OR)

10. a) Explain services and features of TDMA. [8M]

b) Explain the key differences between GSM, CDMA and LTE. [7M]



III B. Tech II Semester Regular Examinations, June-2022

CELLULAR & MOBILE COMMUNICATION

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

UNIT-I

1. a) Describe the performance criteria of Cellular mobile systems. [8M]
b) Explain the concept of cell sectoring. [7M]

(OR)

2. a) Propagation path loss increases not only with frequency but also with distance. Justify. [8M]
b) If a total of 33 MHz of bandwidth is allocated to a particular FDD cellular telephone system which uses two 25 kHz simplex channels to provide full duplex voice and control channels, compute the number of channels available per cell if a system uses: (i) 4-cell reuse (ii) 7-cell reuse (iii) 12-cell reuse [7M]

UNIT-II

3. a) Describe how to find the cochannel interference area which affects a cell site. [8M]
b) Write a short note on adjacent channel interference. [7M]

(OR)

4. a) Outline the two frequency reuse schemes and explain N-Cell reuse pattern in detail for four and seven cell reuse with illustrative diagrams. [8M]
b) Discuss the method of finding C/I ratio in a directional antenna system for 6-sector case in 7-cell reuse pattern. [7M]

UNIT-III

5. a) Describe the fixed channel assignment schemes in detail. [8M]
b) Derive the phase difference between direct and reflected paths. [7M]

(OR)

6. a) Explain the concept of channel sharing and borrowing. [8M]
b) Derive the general formula for mobile radio propagation. [7M]

UNIT-IV

7. a) Explain how the handoffs implemented based on signal strength. [8M]
b) How the dropped call rate is related to the capacity and voice quality. [7M]



(OR)

8. a) What are the various methods of delaying the handoff? Explain briefly. [8M]
b) What is meant by handoff initiation? Explain the different methods of handoff initiation with suitable diagrams. [7M]

UNIT-V

9. a) Why CDMA is needed and explain it with an example? [8M]
b) List the difference between TDMA/FDMA/CDMA. [7M]

(OR)

10. a) Explain GSM architecture in detail. [8M]
b) Write a short note on TDMA structure frame length and frame offset. [7M]



III B. Tech II Semester Regular Examinations, June-2022

CELLULAR & MOBILE COMMUNICATION

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

UNIT-I

1. a) What are the limitations of conventional mobile telephone system? [8M]
- b) Compare macro, micro, femto and picoradio coverage cells in cellular networks. [7M]

(OR)

2. a) Describe the operation of the cellular mobile system. [8M]
- b) If a total of 33 MHz of bandwidth is allocated to a particular FDD cellular telephone system which uses two 25 kHz simplex channels to provide full duplex voice and control channels, compute the number of channels available per cell if a system uses 7-cell reuse. If 1 MHz of the allocated spectrum is dedicated to control channels, determine an equitable distribution of control channels and voice channels in each cell. [7M]

UNIT-II

3. a) Describe the real-time cochannel interference measurement at mobile radio transceivers. [8M]
- b) Explain how the interference is reduced by means of directional antennas. [7M]

(OR)

4. a) Discuss the three cases where lowering the antenna height may or may not help reduce the interference. [8M]
- b) Define the co-channel interference reduction factor and derive the expression for it. [7M]

UNIT-III

5. a) Compare fixed and non-fixed channel assignment methods. [8M]
- b) Discuss the propagation of mobile radio signals over water between two fixed stations. [7M]

(OR)

6. a) Describe about setup channels and access channels. [8M]
- b) Obtain path-loss from a point-to-point prediction model. [7M]



UNIT-IV

7. a) What are the different types of handoffs? Explain how to implement them? [8M]
b) Compare soft and hard handoffs. [7M]

(OR)

8. a) Explain two-hand-off-level algorithms. [8M]
b) What is mobile assisted handoff? Explain. [7M]

UNIT-V

9. a) What is WiMax? Explain the standard features of WiMax. [8M]
b) With suitable block diagram explain the GSM system. [7M]

(OR)

10. a) List out the key differences between 3G and 4G communications. [8M]
b) What is GPRS? Explain the features and benefits of GPRS. [7M]



III B. Tech II Semester Supplementary Examinations, June-2022**INDUSTRIAL ROBOTICS****(Common to ME, ECE)**

Time: 3 hours

Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)2. Answer **ALL** the question in **Part-A**3. Answer any **FOUR** Questions from **Part-B**

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**PART –A****(14 Marks)**

1. a) Define the term flexible automation. [2M]
- b) What are the types of End effectors? [2M]
- c) What is Forward Kinematics Explain? [2M]
- d) What is Newton – Euler formulations? What are its applications? [3M]
- e) What are the advantages of offline programming? [3M]
- f) Discuss robot application for welding and machine loading. [2M]

**PART –B****(56 Marks)**

2. a) Sketch and explain the four basic robot configurations. [7M]
- b) What are the future applications of robot? [7M]
3. a) With neat sketch, explain Robot Architecture. [7M]
- b) What are the requirements and challenges of end effector? [7M]
4. a) Determine the revolution matrix for a rotation of  $45^0$  about y-axis followed by a rotation of  $120^0$  about z-axis, and a final rotation of  $90^0$  about x-axis. [7M]
- b) Derive the Inverse kinematics of the 3-DOF manipulator by considering an example. [7M]
5. a) What do you mean by Lagrangian formulation? What is the use of Lagrange equation? [7M]
- b) What are the singularities of a manipulator? How are they classified? [7M]
6. a) List out the constraints for planning joint interpolated trajectory. [7M]
- b) What are the types of robotic manipulator? What is the difference between robot and manipulator? [7M]
7. a) Discuss differences between the proximity and range sensors with their applications in robots. [7M]
- b) What are the various fields in which the robots used? Discuss them in detail. [7M]

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## III B. Tech II Semester Regular Examinations, June-2022

## DATA MINING

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

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**UNIT-I**

1. a) Explain about the major issues in data mining. [8M]  
b) What is the need of a data warehouse? Explain. [7M]

**(OR)**

2. a) Discuss about the different types of attributes. [8M]  
b) Write short notes on dissimilarity between objects. [7M]

**UNIT-II**

3. a) What is data Integration? What are various issues associated while performing data integration process? [8M]  
b) Explain data discretization techniques. [7M]

**(OR)**

4. a) Explain data cube aggregation and attribute subset selection strategies for data reduction. [8M]  
b) Discuss data reduction as part of data preprocessing. [7M]

**UNIT-III**

5. a) What is decision tree? Write and explain the algorithm for generating decision tree with an example? [8M]  
b) Explain Bayesian Classification. [7M]

**(OR)**

6. a) What is attribute selection measure and write short notes on Gini index measure. [8M]  
b) Write an algorithm for decision tree induction. [7M]

**UNIT-IV**

7. a) Discuss the frequent item sets generation in FP growth algorithm. [8M]  
b) Explain about confidence based pruning. [7M]

**(OR)**

8. a) Write short notes on support counting using a hash tree with a sketch. [8M]  
b) Write short notes on Frequent item sets and Closed Item sets. [7M]



**Code No: R193204F**

**R19**

**SET - 1**

**UNIT-V**

9. a) Discuss about the strengths and weaknesses of DBSCAN [8M]  
algorithm.  
b) Explain about hierarchal clustering. [7M]
- (OR)**
10. a) Discuss about basic K-means algorithm. [8M]  
b) Explain about different clustering techniques. [7M]

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**2 of 2**



Code No: R193204F

R19

SET - 2

III B. Tech II Semester Regular Examinations, June-2022

DATA MINING

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

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**UNIT-I**

1. a) Explain about the applications of data mining. [8M]  
b) Discuss the data visualization. [7M]

**(OR)**

2. a) Write the need and usage of data mining technologies. [8M]  
b) Explain about the similarity between simple attributes. [7M]

**UNIT-II**

3. a) Explain in detail about various data transformation techniques used in data preprocessing. [8M]  
b) Describe how the data can be integrated. [7M]

**(OR)**

4. a) Briefly discuss about data cube aggregation with an example in data reduction process. [8M]  
b) What is the need of data preprocessing and explain about different preprocessing techniques. [7M]

**UNIT-III**

5. a) What is Decision Tree Induction? Explain how it classifies the data. [8M]  
b) Write generic Decision Tree Induction Algorithm. [7M]

**(OR)**

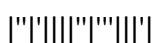
6. a) Explain Attribute selection measures using Information gain with a suitable example. [8M]  
b) Write about predicting a class label using Naive Bayesian classification. [7M]

**UNIT-IV**

7. a) Explain about different types of candidate generation procedures. [8M]  
b) Write an algorithm for rule generation using apriori. [7M]

**(OR)**

8. a) Discuss about maximal frequent item sets with an example. [8M]  
b) Explain about FP-Growth algorithm. [7M]



**UNIT-V**

9. a) Discuss different types of clusters. [8M]  
b) Explain about the issues related to k-means algorithm. [7M]

**(OR)**

10. a) Write short notes on agglomerative hierarchal clustering. [8M]  
b) Explain about the strengths and weaknesses of k-means algorithm. [7M]

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**III B. Tech II Semester Regular Examinations, June-2022**  
**DATA MINING**

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

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**UNIT-I**

1. a) Explain about the different types of data and patterns to be mined. [8M]  
b) Write short notes on pattern recognition. [7M]

**(OR)**

2. a) Differentiate between Database Query and Mining. [8M]  
b) Discuss about different types of attributes. [7M]

**UNIT-II**

3. a) What is a noise? What are the various data smoothing techniques? [8M]  
b) Describe various methods for handling tuples with missing values for some attributes. [7M]

**(OR)**

4. a) Write about data integration and transformation. [8M]  
b) Write about Numerosity Reduction. [7M]

**UNIT-III**

5. a) What is decision tree? Explain how does it work for classification problem? [8M]  
b) Discuss the Naïve Bayesian Classification with an example. [7M]

**(OR)**

6. a) Write an algorithm for decision tree induction. [8M]  
b) Discuss about the following (i) Gini index (ii) Information Gain [7M]

**UNIT-IV**

7. a) Discuss about candidate generation and pruning with an example. [8M]  
b) Explain about closed frequent item sets with an example. [7M]

**(OR)**

8. a) Discuss about the construction of a FP tree with an example. [8M]  
b) Explain about the support and confidence with examples. [7M]

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**R19**

**SET - 3**

**UNIT-V**

9. a) Discuss about DBSCAN algorithm. [8M]  
b) Write short notes on bisecting k-means algorithm. [7M]

**(OR)**

10. a) Write short notes on different clustering techniques. [8M]  
b) List out the strengths and weaknesses of hierarchical clustering. [7M]

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**2 of 2**





## III B. Tech II Semester Regular Examinations, June-2022

## DATA MINING

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

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**UNIT-I**

1. a) What is the need of a data warehouse and differentiate between data warehouse and data base. [8M]  
b) Discuss about various visualization techniques. [7M]

**(OR)**

2. a) Discuss the major issues in data mining. [8M]  
b) Explain about the importance of data mining technologies. [7M]

**UNIT-II**

3. a) What is Data Integration? What are various issues associated while performing data integration process? [8M]  
b) Explain data discretization techniques. [7M]

**(OR)**

4. a) What is data preprocessing? Explain why it is essential before mining the knowledge from data. [8M]  
b) Illustrate data reduction strategies. [7M]

**UNIT-III**

5. a) Differentiate Supervised and Unsupervised Learning. [8M]  
b) Explain Tree Pruning in detail. [7M]

**(OR)**

6. a) What is classification? How does classification work? Discuss its process steps. [8M]  
b) Explain about Bayes' Theorem. [7M]

**UNIT-IV**

7. a) Explain about Market Basket analysis. [8M]  
b) Discuss about Association Rule Mining. [7M]

**(OR)**

8. a) Explain about the apriori principle. [8M]  
b) Write an apriori algorithm for frequent item set generation. [7M]

**UNIT-V**

9. a) Write short notes on k-means as an optimization problem. [8M]  
b) Explain about the importance of cluster analysis. [7M]

**(OR)**

10. a) Discuss the key issues in hierarchical clustering. [8M]  
b) Explain about basic k-means algorithm. [7M]

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Code No: R193204H

R19

SET - 1

III B. Tech II Semester Regular Examinations, June-2022

**MEMS AND ITS APPLICATIONS**

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

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**UNIT-I**

1. a) Explain the basic building blocks of MEMS with neat diagrams. [8M]  
b) Describe the role of quantum physics in the design of MEMS and Microsystems. [7M]

**(OR)**

2. a) Give one application of MEMS in automobiles. Illustrate its working with neat sketches. [8M]  
b) Write a technical note on application of MEMS and Microsystems in  
(i) Biomedical Industry and  
(ii) Aerospace industry. [7M]

**UNIT-II**

3. a) Explain the principle of operation of MEMS pressure sensors with neat diagrams. [8M]  
b) Demonstrate the working of thermocouple with neat diagram. [7M]

**(OR)**

4. a) List some of the piezoelectric materials and piezoresistive materials. Differentiate between them based on their property. [8M]  
b) With block diagram explain the functionality of [7M]  
(i) Micro gripper  
(ii) Micro motors

**UNIT-III**

5. a) Derive equations for acceleration  $a$ , time  $t$  and power density  $P/V$  based on the Trimmer force scaling vector? What information does the force scaling vector provide to the MEMS designer? [8M]  
b) Why electrostatic actuation is preferred over electromagnetic actuation in micro motors? [7M]

**(OR)**

6. a) With reference to scaling of electrostatic forces explain why electrostatic actuation is preferred over electromagnetic actuation in micro motors. [8M]  
b) Compare the properties of Silicon,  $\text{SiO}_2$  and  $\text{SiC}$ . [7M]



**UNIT-IV**

7. a) Explain in detail about Micro systems fabrication process. [8M]  
b) Demonstrate about physical vapour deposition. [7M]

**(OR)**

8. a) Explain with figures the steps in surface micromachining. [8M]  
Discuss the various fabrication challenges associated with surface micromachining.  
b) With neat diagrams explain the different etching processes in detail. [7M]

**UNIT-V**

9. a) Demonstrate the working principle of RF MEMS in [8M]  
(i) RF communication and  
(ii) Global positioning systems.  
b) Explain with neat diagrams any two applications of RF MEMS. [7M]

**(OR)**

10. a) Illustrate about PIN diode RF switches with neat circuit diagram. [8M]  
b) Explain the various contact mechanisms for RF switches. [7M]

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## III B. Tech II Semester Regular Examinations, June-2022

**MEMS AND ITS APPLICATIONS**

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

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**UNIT-I**

1. a) List the types of micro sensors available in the market. With a neat sketch explain the working principal of any two types of sensors. [8M]
- b) Explain MEMS history and development and its application in an health care industry. [7M]

**(OR)**

2. a) Describe the concept miniaturization of MEMS. Distinguish between micro sensors and micro actuators. [8M]
- b) Explain why atomic structure of matter is considered as a decisive factor in micro system. [7M]

**UNIT-II**

3. a) Explain in detail about MEMS chemical sensors. [8M]
- b) Discuss on electrostatic actuation model with neat diagram. [7M]

**(OR)**

4. a) Illustrate the mathematical description of piezoelectric effect with relevant diagrams. [8M]
- b) State the constraints in pumping fluids in micro channels. What pumping scheme is usually used in micro fluidics? Give one example. [7M]

**UNIT-III**

5. a) With reference to scaling of electromagnetic forces, derive the expressions for electromagnetic potential energy and force. [8M]
- b) Explain in detail about scaling in electricity. [7M]

**(OR)**

6. a) Suggest at least one of the properties and applications of the following MEMS Materials. Silicon, Silicon nitride, Poly silicon, Quartz, Nickel, P Type silicon, gold, conductive polymers. [8M]
- b) What is meant by packaging? What are the special requirements for packaging materials? Which material is used for packaging? [7M]

**UNIT-IV**

7. a) Explain in detail about chemical vapour deposition techniques. [8M]
- b) Discuss the criteria for selecting materials for the masks used in etching. [7M]



**(OR)**

8. a) Explain with neat sketches, various process steps in bulk micromachining process to fabricate a pressure sensor. [8M]  
b) Describe steps of fabrication of a square tube using LIGA process. [7M]

**UNIT-V**

9. a) What are the advantages of using RF MEMS as compared to traditional units and systems? [8M]  
b) What is a phase shifter? Explain the principle of operation of a switched-line phase shifter. [7M]

**(OR)**

10. a) Explain the RF design consideration to be taken into account while designing RF switch. [8M]  
b) List out the integrating and biasing issues for RF switches. [7M]

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## III B. Tech II Semester Regular Examinations, June-2022

**MEMS AND ITS APPLICATIONS**

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

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**UNIT-I**

1. a) What are main components of Microsystems? Explain each component briefly. [8M]
- b) Describe the evolution of Micro fabrication. [7M]

**(OR)**

2. a) Summarize the applications of Microsystems in different industries. [8M]
- b) What are MEMS and Microsystems? How will you classify them from the conventional systems? [7M]

**UNIT-II**

3. a) Explain in detail about MEMS biosensors. [8M]
- b) Describe the operating principle of two types of micro motors with suitable schematics. [7M]

**(OR)**

4. a) With suitable diagrams explain the working principle of Micro valves and micro pumps also discuss their various applications with regard to actuation. [8M]
- b) Explain the principle of operation of micro-accelerometer with a neat schematic diagram. [7M]

**UNIT-III**

5. a) With suitable diagram explain the principles of piezoelectric micro cantilever beam. Describe in detail about pressure sensors. [8M]
- b) List the properties and applications of piezoelectric materials. [7M]

**(OR)**

6. a) Explain scaling in heat conduction and heat convection. [8M]
- b) State three relevant properties of silicon carbide and silicon nitride for use in Microsystems. [7M]

**UNIT-IV**

7. a) Demonstrate the steps involved in photolithography. State the chemicals used in each of the stages along with the operating conditions. [8M]



- b) State various chemical vapor deposition techniques. Explain in brief the techniques of chemical vapor deposition for MEMS device fabrication. [7M]

**(OR)**

8. a) Describe the role of sacrificial layers in surface micromachining with figures. Give examples of two sacrificial materials used in micro system fabrication. [8M]  
b) Explain in detail about epitaxial deposition. [7M]

**UNIT-V**

9. a) Illustrate about various actuation methods used in RF switching. [8M]  
b) Explain the working of RF based communication system. [7M]

**(OR)**

10. a) Demonstrate the reconfigurable antenna using RF MEMS switch? [8M]  
b) Explain the fabrication of MEMS capacitive switch. [7M]

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R19

SET - 4

III B. Tech II Semester Regular Examinations, June-2022

**MEMS AND ITS APPLICATIONS**

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

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**UNIT-I**

1. a) What is MEMS? What are the types of MEMS transducers? Give advantages and disadvantages of MEMS. [8M]
- b) Distinguish between Microelectronics and Microsystems. [7M]

**(OR)**

2. a) Illustrate about Intelligent Microsystems with neat diagram. [8M]
- b) Demonstrate the multi-disciplinary nature of Microsystems engineering. [7M]

**UNIT-II**

3. a) Describe the principle of operation of acoustic sensors and actuators with neat diagrams. [8M]
- b) Explain with neat diagram actuation using shape memory alloys. [7M]

**(OR)**

4. a) Explain the concept of cantilever piezoelectric actuator model with neat diagram. [8M]
- b) Outline the working principle of micro-valves and micro fluids. [7M]

**UNIT-III**

5. a) With reference to scaling of electrostatic forces explain why electrostatic actuation is preferred over electromagnetic actuation in micro motors. [8M]
- b) Describe about scaling in Electromagnetic forces. [7M]

**(OR)**

6. a) Demonstrate the oxide growth process in silicon with relevant figures. [8M]
- b) Explain scaling in fluid mechanics. What are the advantages of piezoelectric pumping? [7M]

**UNIT-IV**

7. a) With a neat diagram explain in detail about ion implantation and diffusion. [8M]
- b) Explain in detail about the process of oxidation. [7M]





**(OR)**

8. a) State two advantages of LIGA process over other micro machining techniques. Explain with block diagram the steps in LIGA process. State atleast one commonly used chemical in each of the steps. [8M]
- b) Demonstrate the thin film deposition techniques. [7M]

**UNIT-V**

9. a) Describe about RF MEMS and MEMS inductors. [8M]
- b) Explain the potential applications of RF MEMS in wireless communication? [7M]

**(OR)**

10. a) Draw and explain the equivalent circuit of RF MEMS switch? [8M]
- b) Discuss electromagnetic modeling of RF shunt switch? [7M]

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## III B. Tech II Semester Regular Examinations, June-2022

**OPERATING SYSTEMS**

(Common to EEE, ECE)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

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**UNIT-I**

1. a) Discuss the key functions and types of operating system. [10M]
- b) What is operating system debugging and booting? [5M]

**(OR)**

2. a) Explain in detail about various types of System Calls handled by operating system. [8M]
- b) Explain the major activities of operating system in connection with process and memory management. [7M]

**UNIT-II**

3. a) Explain the role of Process Control Block in operating system and describe its attributes. [8M]
- b) Write the important characteristics of Round Robin Scheduling algorithm. And demonstrate its performance for the following workload in a system with time quantum = 2 units. [7M]

Consider the set of 5 processes whose arrival time and burst time are given below

| Process | Arrival Time | Burst Time |
|---------|--------------|------------|
| P1      | 0            | 5          |
| P2      | 1            | 3          |
| P3      | 2            | 1          |
| P4      | 3            | 2          |
| P5      | 4            | 3          |

Draw a Gantt chart illustrating the execution of these jobs and also Calculate the average waiting and turnaround times.

**(OR)**

4. a) Write about the different multithreading models in operating system. [8M]
- b) What is critical section in Readers-Writer's problem? Suggest a fair solution for the Readers-Writers problem. [7M]



**UNIT-III**

5. a) What is a Page fault? Explain various ways to handle a page fault. [5M]  
b) Explain the Copy-on-write technique and its benefits. [5M]  
c) What is Thrashing? What is the cause of Thrashing? How does the system detect Thrashing? [5M]

**(OR)**

6. a) A system uses 4 page frames for storing process pages in main memory. Assume that all the page frames are initially empty. Find the number of Page faults, Hit ratio and Miss ratios for Optimal Page replacement algorithm while processing the page reference string given below: [8M]  
1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6  
b) How does Virtual memory impact a computer's performance? Give explanation and also discuss the merits and demerits of virtual memory implementation. [7M]

**UNIT-IV**

7. a) Describe the necessary conditions for the occurrence of deadlock. [8M]  
b) Why Ostrich algorithm is considered the best solution for deadlock handling? Explain the Ostrich algorithm. [7M]

**(OR)**

8. a) Briefly explain about Single-level, Two-level and Tree-Structured directory implementations. [8M]  
b) Explain and compare the FCFS and SSTF disk scheduling algorithms. [7M]

**UNIT-V**

9. a) Briefly explain about Program, System and Network threats. [10M]  
b) How is Cryptography used for Security and Authentication? [5M]

**(OR)**

10. a) What does the Access control matrix represent? Explain the implementation of Access control matrix. [8M]  
b) Explain the core components of Linux operating system. [7M]

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