TE / EXTC / Sem VI / Rev
Microprocessor & microcontroller

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Con. 6416–10. **(REVISED COURSE)** **GT–7548**

(3 Hours) **[Total Marks : 100**

N.B: 1) **Question no one is compulsory.**
2) **Solve any four from remaining six questions.**

1a) Design 8086 based microcomputer system using minimum mode with following specification **12**
- CPU working at 5Mhz
- 32 KB SRAM (16K X 8 Device)
- 32 KB EPROM (8 K X 8 Device)

Clearly show address decoding with appropriate address map using exhaustive decoding. Draw a neat schematic.

b) Explain in brief the memory organization of PIC18Fmicrocontroller and also explain the purpose of processor stack. **08**

2a) Write a program for PIC18F to read 8 bit data on port B , swap the nibbles and output the result on port D. **10**

b) Explain how an interrupt is processed and interrupt service routine is executed in PIC18F. **10**

3a) Write a program for performing 32 bit X 32 bit multiplication using 8086.Assume the operands and result are stored in memory. **10**

b) Explain following instructions in PIC18F **10**
a) MOVLW b) BCF c) ADDWF d) RLF e) COMF

4a) Give two examples of each type of addressing mode in 8086 **08**
a) Direct addressing b) Based addressing
c) Based and Indexed Addressing d) Implicit Addressing

b) Explain any two operations of Timer in PIC18F and write a program to calculate delay of 100 microsecond (frequency 40 MHz). **12**

5a) Write a program to divide the unsigned 16-bit number 0F0F h stored in data register REG1 and REG2 (MSB in REG2) by 8. **10**

b) Draw interface of 8086 – 8087 and explain its working with the help of queue status, request / grant and busy / test interface. **10**

6a) Explain different modes of operation of DMA Controller. **10**

b) Write an assembly language program using 8086 instructions for an up counter, which counts from 00 to 7F (hexadecimal). It starts on occurrence of an interrupt and counts up by ten digits every time the interrupt arrives. **10**

7a) What is segmented memory and what are its advantages? Explain logical and physical address in 8086. What are default segment assignments and what is segment override? Explain with suitable examples. **10**

b) Explain flag register of 8086. Show with suitable examples how direction flag is useful in string instructions. **10**

TE / EXTC / Sem VI / Rev
Antenna & WP

Mha I 10 8

h-12-10

Con. 5721-10. **(REVISED COURSE)** **GT-7644**

(3 Hours) **[Total Marks : 100**

N.B. : (1) Question No. 1 is **compulsory.**
(2) Answer any **four** questions from the remaining **six** questions,
(3) Assume any **suitable** data wherever **required.**
(4) **Figures** to the **right** indicate **full** marks.

1. Answer the following :— **20**
   (a) Draw and explain the Transmission-line Thevenin equivalent of an antenna in the transmitting and receiving mode.
   (b) Discuss the voltage and current distribution of a half-wave dipole antenna. Can we say the antenna is resonant ?
   (c) Explain the principle of pattern multiplication with a suitable example.
   (d) Deduce the wave equations for a plane wave in free space with the help of Maxwell's equations.

2. (a) Derive the expression for radiation resistance of an infinitesimal dipole. Explain its significance. **10**
   (b) Explain the significance of the term "Effective Area of an Antenna". Derive the relationship between effective area and directivity of any antenna. **10**

3. (a) Derive the array factor of a N-element uniform linear array and hence deduce the condition for which the array will radiate in the broadside and end-fire direction. **10**
   (b) Analyze the performance of an antenna when placed rear or on the infinite flat perfect conductor using Image theory. **10**

4. (a) Explain the working of a microstrip antenna with the help of transmission-line model. Also give its applications. **10**
   (b) Explain different types of horn antennas. Find its directivity and beam width. **10**

5. (a) Describe how the radiation pattern of a given antenna can be measured experimentally. **10**
   (b) Explain the different components of the ground waves. What are frequency characteristics of the ground waves ? **10**

6. (a) Design a broadside Dolph-Tschebyscheff array of 10 elements with spacing 'd' between the elements and with a major to minor lobe ratio of 26 dB. Find its excitation coefficients and array factor. **10**
   (b) Explain the principal modes of operation of helical antennas and draw its radiation pattern. **10**

7. Write notes on :—
   (a) Dielectric wave guide. **7**
   (b) Antennas used in satellite and mobile communications. **7**
   (c) Floded dipole antenna and its applications. **6**

Con. 6343-10. (OLD COURSE) GT–7359

(3 Hours) [Total Marks : 100

N. B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** out of remaining **six** questions.
(3) Assume any **suitable** data.

T.E. | EXTC | Sem VI | Old A&WP

1. Explain the following :—
   (a) Radiation resistance, antenna beam width, directive gain, effective area, antenna equivalent circuit **5**
   (b) Compare travelling wave and standing wave antenna **5**
   (c) Sky wave propagation **5**
   (d) FRIIS transmission formula. **5**

2. (a) What is the effective area of a half wave dipole operating at 500 MHz. **8**
   (b) Show that the radiation resistance of a wire dipole is given by $R_{rad} = 80\pi^2 \left(\frac{dl}{\lambda}\right)^2$ where *dl* is the small length of wire dipole. **8**
   (c) What are the directional characteristics of dipole antenna. **4**

3. (a) Derive the expression for electric and magnetic field for a small loop antenna. Compare them with these of infinitesimal small dipole. **10**
   (b) Explain the principle of pattern multiplication and find out the array factor for two different arrays. **10**

4. (a) Explain with suitable diagram the working of log periodic antenna. Write its practical application. **10**
   (b) Show the radiation pattern of center-fed vertical dipole and center-fed horizontal dipole. **10**

5. (a) Draw and explain yagi antenna. Sketch its radiation pattern. Write down the application of yagi antenna. **10**
   (b) A uniform linear array is required to produce an end fire beam when it is operated at 10GHz. It contains 50 radiations and are spaced $0{\cdot}5\lambda$. Find the progressive phase shift to produce the end fire beam. Find the array length. **10**

6. (a) Explain the mechanism of isotropic propagation. Define critical frequency, MUF and OWF. **10**
   (b) Describe space wave propagation and derive the relationship for maximum distance between transmitting and receiving antenna. Earth is assumed to be flat. **10**

7. Write short notes on :— **20**
   (a) Sleeve dipole
   (b) Tropospheric scatter propagation
   (c) Construction, application and advantage of microstrip antenna
   (d) Retarded potential and its application.

Con. 5566–10. (REVISED COURSE) GT–7642

(3 Hours) [Total Marks : 100

N.B. : (1) Question No. 1 is **compulsory**.
(2) Attempt any **four** from the remaining questions.
(3) **Figures** to **right** indicate **full** marks.
(4) Assume **suitable** data if **necessary** but **justify** the same.

T.E. | EXTC | Sem VI | Rev.
Television & Video Engg.

1 Answer the following questions: [20]

A) What are the advantages and disadvantages of negative modulation?

B) Define the following characteristics of a camera tube:

i. Spectral Response

ii. Sensitivity

C) Mention four special features of digital TV which cannot be easily incorporated in analog TV.

D) What are the various streaming media protocols?

2 A) Explain in detail the Real-Time Streaming Protocol for initiating and directing delivery of streaming data from video servers. [10]

B) Describe the construction and explain the working principle of a vidicon camera tube. Discuss how it suffers from image lag. [10]

3 A) Draw a block diagram of a basic monochrome television system and explain how it works. [10]

B) Explain the phenomenon of interleaving of colour signals. How does it help in ensuring compatibility? [10]

4 A) Describe briefly the alignment procedure and precautions for aligning the following sections of the receiver: i) RF tuner ii) FM discriminator circuit. [10]

B) Explain the delay line method of separating U and V signals in a PAL receiver. What is the function of a colour killer circuit in the path of chrominance signal in the receiver? [10]

5 A) Describe how various patterns are generated in a video pattern generator. [10]

B) With a neat block diagram explain the essential elements of a satellite communication system. [10]

6 A) Draw the block diagram of NTSC transmitter and explain the function of each block. [10]

B) Sketch and fully label the desired response of a TV receiver that includes the necessary correction on account of the discrepancy caused by vestigial sideband transmission. [10]

7 A) Discuss the importance of synchronization in a TV broadcast. [4]

a. Explain the mixing of colours. [4]

b. Why colour burst signal is transmitted along with the video signal in a colour TV system? [6]

c. Describe the working of a CCTV system. [6]

Electronics & Telecommunication
Sem VII

VT-Oct-10-17

Con. 5825–10. **(REVISED COURSE)** **GT–7629**

(3 Hours) **[Total Marks : 100**

Acoustics Engineering

N.B. : (1) Question **No. 1** is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.
(3) Assume **suitable** data wherever **necessary**.

1. (a) Find the speed of sound in air at 20°C and one atmospheric pressure. Air has density 1·21 kg/m^3 and ratio of specific heats 1·402 at 20°C. **5**
   (b) Explain the term-acoustic reciprocity with reference to simple source. **5**
   (c) A room of 12 m x 10 m x 4 m has an average sabine absorptivity $\overline{a} = 0{\cdot}1$, find the reverberation time of room. **5**
   (d) Explain in brief the construction and working of moving coil electrodynamic microphone. **5**

2. (a) List out the properties of transducers which are used in radiation and reception of acoustic waves.
   Explain any four properties of transducers in brief. **10**
   (b) Show that the intensity of travelling wave $P = P_0 e^{-\alpha x} e^{j(wt-kx)}$ satisfies the equation $\frac{1}{I} dI / dx = -2\alpha$. **10**

3. (a) What are the methods of images ? **10**
   (b) Derive an expression for the instantaneous energy density for acoustic waves. **10**

4. (a) Explain the Helmholtz resonator. **10**
   (b) State and explain the fundamental properties of hearing. **10**

5. (a) What are acoustic factors in architectural design ? **10**
   (b) Explain the noise induced hearing loss and also give the permissible daily noise exposure limits for industrial noise recommended by OSHA. **10**

6. (a) Explain the calibration of receivers. **10**
   (b) What are the different types of loudspeaker cabinets. **10**

7. Write short notes on (any **two**) :– **20**
   (a) Piezo-electric microphone
   (b) Highway noise
   (c) Acoustic filters–Highpass and Lowpass.

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Con. 6098–10. (REVISED COURSE) GT–7647

(3 Hours) [Total Marks : 100

TE / EXTC / Sem VI / Rev.

N.B. : (1) Question No. 1 is **compulsory**.
(2) Solve any **four** questions out of remaining **six** questions.

MP & MC – II

1.A) Why is it necessary to make even and odd banks while interfacing any kind of ROM to 8086. (05)

B) Write short note on modes of DMA transfer. (05)

C) Explain features of PIC 18. (05)

D) Write an assembly language program using 8086 instructions for an up counter which counts from 00 to 8E. (05)

2.A) Draw interfaces of 8086-8087 and explain it's working (10)

B) Design a system using 8255 to generate a square wave of 1 KHz write corresponding program. (10)

3.A) Explain Addressing modes of PIC 18. (10)

B) Explain following instructions of PIC 18

i) ANDWF f, d, a,

ii) BTFSC f, b, a,

iii) RRNCF f, b, a,

iv) BZ n

v) MOV LB k (10)

4. A) Interface PIC 18 with six seven segment displays and explain. (08)

B) Write a program to read the current value of port C into WREG register. (06)

C) Distinguish between BIU and EU of 8086. (06)

5.A) Explain 8086 maximum mode of operation in detail. (10)

B) Draw timing diagram for minimum mode 8086. Read bus cycle. (05)

C) Write short note on mixed language programming. (05)

6. A) Explain interrupts structure of 8086 in detail. (10)

B) Draw and explain interfacing of 8086 and 8259. (10)

7.A) Design 8086 based system with the following specifications

1) 8086 working of 10 MHz

2) 32 KB EPROM.

3) 16 KB RAM

Draw memory map and show decoding. (12)

B) What are assembler directives. (08)

T.E / Electronic & Telecommunication
Sem VI

P4–Con No–73

Con. 5749–10. **(REVISED COURSE)** **GT–7635**

(3 Hours) **[Total Marks : 100**

Digital Telephony

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt **four** questions out of **six** questions.
(3) **Figures** to the **right** indicate **full** marks.
(4) Assume **suitable** data wherever **required** with **justification**.

Q.1> **1)** Differentiate Between Time Division Switching and Space Division Switching. (05)

2) Write a note on Waiting Time Jitter. (05)

3) Explain working principle of Telephone using DTMF. (05)

4) Write a short note on RSVP. (05)

Q.2> **1)** In a Group of 10 Servers, each is occupied for 30 minutes in an observation interval of two hours. Calculate the traffic carried by the group. (10)

2) What is Digital Subscriber Loop (DSL)? State various DSL Technologies in detail. (10)

Q.3> **1)** Describe ATM Protocol Stack in detail, clearly mentioning Adaptation Layer. (10)

2) A subscriber makes three phone Calls of three minutes, four minutes and two minutes duration in a one-hour period. Calculate the subscriber traffic in Erlangs, CCS and CM. (10)

Q.4> **1)** Explain following terms with respect to Digital Switched Networks: 'Network Management' and' Network Control'. (10)

2) a) State Advantages and Disadvantages of 'Digital Voice Networks'. (05)
b) Master-Slave Synchronization and Packetization. (05)

Q.5> **1)** Explain TCP /IP Protocol Architecture in detail. (10)

2) What is VOIP? Explain detailed architecture of H.323 Protocol. (10)

Q.6> 1) Describe ISDN, its categories, content and working in detail. (10)

2) Write a short note on : (05)

a) Network Blocking Probability.

b) Master-Slave Synchronization and Packetization (05)

Q.7> 1) Explain SS7 Protocol Architecture in detail. (10)

2) a) Compare between STS and TST (05)

b) Explain the Benefits of ATM **(05)**

TE/EXTC/SemVI/Old
sub-MC&EP

30-11-10

Con. 5548-10. **(OLD COURSE)** **GT–7350**

(3 Hours) **[Total Marks : 100**

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** from remaining **six** questions.

1. a) Design a 8051 based data acquisition system to store all the samples of temperature of a furnace sensed in 24 hours. Two samples are taken every minute. Also write a program to strore the highest value at reg A. 15
   b) Differentiate between microprocessors and microcontrollers. 05

2. a) Explain the clock timing of 8051. Give and explain the formula for calculating instruction cycle time for 8051. Generate a software delay of 50 m.sec. 10
   b) Write a 8051 program to convert a packed BCD number in register A and store the result in R0 and R6 of bank 2. 10

3. a) Explain the serial port of 8051. Write a program to transmit "hello" at maximum possible baud rate. 12
   b) Explain the following instructions in 8051.
   i. MOV C, P0.7 ii. XCHD A,TL0 iii. CJNE A, 24H,Repeat iv. RETI 08

4. a) Differentiate between
   i. ALU and RALU ii. Timer/Counter and Watchdog Timer
   iii. I/O and HSI/O 12
   b) Explain the addressing modes 80196 microcontroller with examples. 08

5. a) Explain the following 80196 instructions.
   i. LDBSE ii. ADD iii. MULU iv. IDLPD v. BMOV 10
   b) Discuss different types of inter-task communication in RTOS. 10

6. a) Explain briefly different types of Embedded Software Architechure. 12
   b) Explain the important features of Real Time Operating System. 08

7. Write short notes on :
   i. Pulse Width Modulator of 80196.
   ii. ADC of 80196.
   iii. Memory Management in RTOS. 20

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TE/ ExTc/ Sem VI/ Old
Electronic Instrumentation

Con. 5557-10. **(OLD COURSE)** **GT-7353**

(3 Hours) **[Total Marks : 100**

N.B.: (1) Question No. **1** is **compulsory** and answer any **four** of the remaining **six** questions.
(2) Assume **suitable** data if **necessary**.
(3) Diagrams should be **neatly** written and **labeled**.

1. (a) ISA symbols **20**
   (b) Feed forward control
   (c) Multi-channel DAS
   (d) Hygrometer.

2. (a) Explain the working of a PID controller. State its field of applications. **10**
   (b) Explain the basic concepts of neural networks. **10**

3. (a) What are the different methods of flow measurement ? Describe any two in detail. **10**
   (b) Discuss the different types of level measurement transducers. (atleast two) **10**

4. (a) Explain the various static characteristics of a measurement system. **10**
   (b) Compare and contrast RTD, thermocouple and thermistor. **10**

5. (a) Explain any one method by A to D conversion and D to A conversion. **5+5**
   (b) Derive an expression for the gain of a 3 op-amp Instrumentation Amplifier. **10**

6. (a) What is a floating controller ? Explain the working. What are the merits and demerits ? **10**
   (b) Explain the construction, working and applications of a strain gauge. **10**

7. (a) Define the following :— **10**
   (i) Process lag
   (ii) Process load
   (iii) Process equation
   (iv) Dead time
   (v) Cycling
   (vi) Control parameter range
   (vii) Variable range
   (viii) Error
   (ix) Control lag
   (x) Control paradigms.

   (b) Explain the construction and operations of LVDT. Compare it with RVDT. **10**

TE/ EnTC/ Sem VI/ Rev
Digital Communication

Con. 5560-10. **(REVISED COURSE)** **GT-7617**

(3 Hours) **[Total Marks : 100**

N.B. (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.

1. Explain whether **true OR false** :— **20**
   (a) ISI in MSK is more than QPSK.
   (b) The signal to noise ratio of matched filter does not depend on the shape of input waveform.
   (c) Bit rate that can be achieved over a channel of given bandwidth using RZ PCM signal is more than NRZ PCM signal.
   (d) Differential encoding is immune to bit inversion by channel.

2. (a) Define Entropy and Information rate of Discrete Memoryless source. Consider a DMS with a source alphabet { S_0, S_1, S_2 } and source statistics { 0·7, 0·15, 0·15 }. **10**
   Find :
   (i) Information content of each message
   (ii) Entropy of DMS
   (iii) Information rate of DMS if it generates messages at the rate of 4 K messages/sec.
   (b) State and explain channel capacity theorem for a band limited power limited white gaussian channel. Consider a TV display of 30 frames/sec. There are approximately 2×10^5 pixels/frame. Each pixel requires 16 bits for display. Using SNR of 25 dB, calculate the bandwidth required to support the transmission. **10**

3. (a) Why is bandlimiting of signal necessary ? What are its disadvantages ? List the methods to overcome them. **8**
   (b) With a relevant block diagram, explain duobinary signalling scheme. Why is it called correlative coding ? Plot the output for bitstream 101100. Explain the drawbacks of above encoder. How are they overcome ? **12**

4. (a) Explain 8-ary PSK w.r.t. the following :— **10**
   (i) Modulator and demodulator
   (ii) Plot PSD, show band width, find spectral efficiency.
   (iii) Final Eucledian Distance.
   (b) The generator polynomial for a systematic (7, 4) cyclic code is $g(x) = 1 + x + x^3$. **10**
   (i) Draw the block diagram for encoder and syndrome calculaor for his code.
   (ii) Find the code polynomial for message vector { 0 1 0 1 }
   (iii) If the first bit of transmitted word is in error, find the syndrome.

[TURN OVER

5. (a) For a bit stream of 0 1 1 0 1 0 0 1 1 plot the waveforms of — 10
   (i) BPSK
   (ii) DPSK
   (iii) FSK ($f_H = 2\ f_b$, $f_L = f_b$)
   (iv) QPSK
   (v) MSK (m = 7).

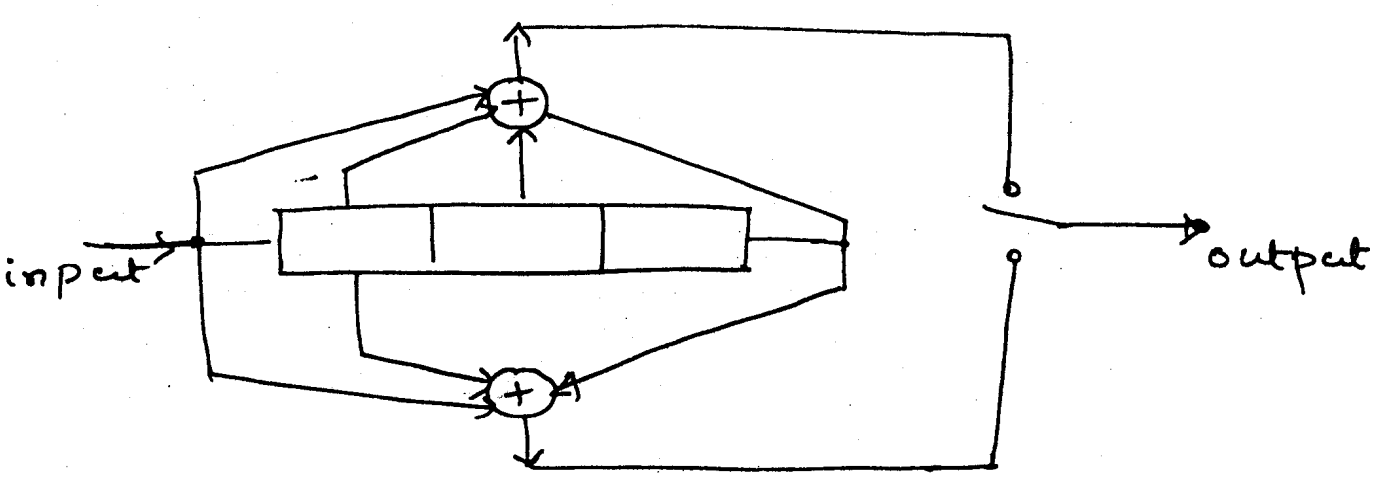
   (b) The parity check matrix of (7, 4) block code is given by — 10

$$\begin{bmatrix} 1 & 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 1 & 0 \\ 1 & 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$$

   (i) Find generator matrix.
   (ii) List code words for m = [0 0 1 1], [1 0 0 1].
   (iii) How many errors canbe detected and corrected ? Why ?
   (iv) For a received code word R = [1 0 0 0 0 1 1 0], find the syndrome, transmitted code word c and message word m.

6. (a) State and explain maximum likelihood decision rule. 10
   Explain the functioning of correlator receiver.

   (b) Find the code rate, constraint length and generator polynomial for the convolutional encoder shown below. 10
   Determine encoder output for message sequence { 1 1 0 0 1 } and { 1 0 1 1 1 }.



7. (a) Find and plot matched filter output when input is — 8

$$s(t) = \sqrt{\frac{2}{T}} \cos 2\pi f_c t \ ; \qquad 0 \le t \le T$$

$$= 0 \qquad ; \qquad \text{elsewhere}$$

   (b) Write short notes on :— 12
   (i) Burst Error Correction
   (ii) Gram Schmidt Procedure
   (iii) QAM.

T.E. / Electronic & Telecommunicatio
Sem VI
Radar Engineering

Con. 6078-10. **(REVISED COURSE)** **GT-7623**

(3 Hours) **[Total Marks : 100**

N.B. : (1) Question No. **1** is **compulsory.**
(2) Attempt any **four** questions out of remaining **six** questions.
(3) **Figures** to the **right** indicate **full** marks.

1. (a) Explain the mechanism of range tracking of a moving target. **5**
(b) Explain the factors which govern the pulse repetation frequency. **5**
(c) What are the properties of Sea and and Land clutter ? **5**
(d) Explain Doppler shift and its role in pulsed and CW RADAR. **5**

2. (a) What do you mean by RCS flctuations ? Explain different swerlings model for RCS fluctuations. **10**
(b) Explain the methods for the integration of radar pulses to improve detection. Define the term integration improvement factor. How does this factor affect the radar range equation ? **10**

3. (a) Draw the block diagram of a FM-CW radar using sideband superheterodyne receiver and explain its principle of operation. **10**
(b) Discuss the major techniques available to radar designer to enable detection of desired targets in the presence of undesired clutter echoes. **10**

4. (a) Draw the functional block diagram of an MTI radar system and explain its operation. Define the terms range tracking and MTI improvement factor. **10**
(b) What do you mean by blind speed ? Explain in detail how this problem is overcome in pulse doppler radar. **10**

5. (a) Explain the working of two coordinate amplitude comparison monopulse tracking RADAR and sketch the ideal feed-aperture illumination for sum and difference channels. **10**
(b) Draw the block diagram of CW radar using IF stage in the receiver and explain its operation. What is the necessity for IF stage and the doppler bank filter ? **10**

6. (a) Derive the radar range equation as governed by minimum detectable signal to noise ratio. Enumerate the system losses that might occur in a long range surveillance radar and indicate the typical value of the losses due to each factor. **10**
(b) What are the advantages of phased array antennas over conventional antennas for RADAR applications ? **10**

7. Write short note on :—
(a) Function of a dyplexer in a radar system. **5**
(b) Conical scan tracking. **5**
(c) Factors which influence the bandwidth of a radar releiver. **5**
(d) Delay line canceler. **5**

T.E. Electronics & Telecommunication

Sem VI

Con. 6076-10. **(REVISED COURSE)** **GT-7638**

Micro Electronics

(3 Hours) **[Total Marks : 100**

N.B. : (1) Question No. **1** is **compulsory.**
(2) Solve any **four** questions from **remaining** questions.
(3) Assume **suitable** data whenever **necessary** and mention the **same** in answer sheet.

1. Solve any **four** :— **20**
   (a) Defien LSI, MSI, and VLSI.
   (b) Draw various configurations of monolithic planar diode. Which one is best and why ?
   (c) Explain hot carrier effects in MOSFET.
   (d) List different types of resistors used in monolithic Integrated circuits.
   (e) Differentiate between MOSFET and BJT.

2. (a) What are different types of single crystal growth technique ? Explain one of them in detail. **10**
   (b) Explain with neat diagram, how ion implantation is used to create junctions in monolithic Integrated circuits. **10**

3. (a) Explain with neat cross-sectional views fabrication process of BJT. **10**
   (b) What are different isolation techniques used in Integrated circuits ? Explain one of them in detail. **10**

4. (a) Explain operation of MOSFET with the help of its current-voltage characteristics. **10**
   (b) Explain fabrication process of NMOS transistor with neat diagrams. **10**

5. (a) Explain operation of TTL NAND gate, with the help of voltage transfer characteristics. **10**
   (b) Discuss different parasitic effects in MOS transistors. **10**

6. (a) Implement following function using standard CMOS logic :— **10**
      (i) $Y = \overline{ABC + AD}$
      (ii) $Y = \overline{A \cdot (B + D) + C}$
   (b) Draw the layout of CMOS inverter using λ design rules. **10**

7. Write short notes on any **four** :— **20**
   (a) Lateral and Vertical transistor.
   (b) Photolithography.
   (c) IC crossovers.
   (d) Transient response of CMOS Inverter.
   (e) IC Inductors.

T.E. Electronic & Telecommunication
Sem VI

Con. 6354-10. **(REVISED COURSE)** **GT-7626**

Neural Network & Fuzzy Logic

(3 Hours) **[Total Marks : 100**

N.B.: (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.
(3) Assume suitable **data** if **required**.

1. (a) $\underset{\sim}{A} = \left\{\frac{1}{2} + \frac{0{\cdot}5}{3} + \frac{0{\cdot}3}{4} + \frac{0{\cdot}2}{5}\right\}$ **5**

$\underset{\sim}{B} = \left\{\frac{0{\cdot}5}{2} + \frac{0{\cdot}7}{3} + \frac{0{\cdot}2}{4} + \frac{0{\cdot}4}{5}\right\}$

Calculate :

(i) $\underset{\sim}{A} \cup B$ (ii) $\overline{\underset{\sim}{A}} \mid \overline{\underset{\sim}{B}}$ (iii) $\underset{\sim}{A} \cap \underset{\sim}{B}$

(b) Explain any two types of De-fuzzification. **5**
(c) Explain in brief delta learning rule. **5**
(d) Explain salient features of Kohonen self organizing map. **5**

2. (a) Prove the following properties of λ-cut on fuzzy relation. If $\underset{\sim}{R}$ & $\underset{\sim}{S}$ are the fuzzy relation :— **8**

(i) $\left(\underset{\sim}{R} \cup \underset{\sim}{S}\right)_\lambda = R_\lambda \cup S_\lambda$

(ii) $\left(\underset{\sim}{R} \cap \underset{\sim}{S}\right)_\lambda = R_\lambda \cap S_\lambda$

(iii) $\left(\overline{\underset{\sim}{R}}\right)_\lambda = \overline{R}_\lambda$

(b) Draw the architecture of simple perceptron network. Explain briefly perceptron learning algorithm and develop a perceptron network to implement AND function. **12**

3. (a) What is self-organizing map ? Explain the Kohonen self-organizing map with learning algorithm. **8**
(b) Explain the various methods of De-fuzzification in detail. **8**
(c) How is Hopfield network converted to Boltzman machine. **4**

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T.E. Electronic & Telecommunication
Sem VI

Con. 6354-10. **(REVISED COURSE)** **GT-7626**

Neural Network & Fuzzy Logic

(3 Hours) **[Total Marks : 100**

N.B.:(1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.
(3) Assume suitable **data** if **required**.

1. (a) $\underset{\sim}{A} = \left\{\frac{1}{2} + \frac{0.5}{3} + \frac{0.3}{4} + \frac{0.2}{5}\right\}$ **5**

$\underset{\sim}{B} = \left\{\frac{0.5}{2} + \frac{0.7}{3} + \frac{0.2}{4} + \frac{0.4}{5}\right\}$

Calculate :

(i) $\underset{\sim}{A} \cup B$ (ii) $\overline{\underset{\sim}{A}} \mid \overline{\underset{\sim}{B}}$ (iii) $\underset{\sim}{A} \cap \underset{\sim}{B}$

(b) Explain any two types of De-fuzzification. **5**
(c) Explain in brief delta learning rule. **5**
(d) Explain salient features of Kohonen self organizing map. **5**

2. (a) Prove the following properties of λ-cut on fuzzy relation. If $\underset{\sim}{R}$ & $\underset{\sim}{S}$ are the fuzzy relation :— **8**

(i) $\left(\underset{\sim}{R} \cup \underset{\sim}{S}\right)_\lambda = R_\lambda \cup S_\lambda$

(ii) $\left(\underset{\sim}{R} \cap \underset{\sim}{S}\right)_\lambda = R_\lambda \cap S_\lambda$

(iii) $\left(\overline{\underset{\sim}{R}}\right)_\lambda = \overline{R}_\lambda$

(b) Draw the architecture of simple perceptron network. Explain briefly perceptron learning algorithm and develop a perceptron network to implement AND function. **12**

3. (a) What is self-organizing map ? Explain the Kohonen self-organizing map with learning algorithm. **8**
(b) Explain the various methods of De-fuzzification in detail. **8**
(c) How is Hopfield network converted to Boltzman machine. **4**

[TURN OVER

4. (a) The following three membership functions of power transistors has given for average current, average voltage and cost in Rs. **12**

$$\underset{\sim}{I} = \left\{ \frac{0\cdot4}{0\cdot8} + \frac{0\cdot7}{0\cdot9} + \frac{1}{1} + \frac{0\cdot8}{1\cdot1} + \frac{0\cdot6}{1\cdot2} \right\}$$

$$\underset{\sim}{V} = \left\{ \frac{0\cdot2}{30} + \frac{1}{45} + \frac{1}{60} + \frac{0\cdot9}{75} + \frac{0\cdot7}{90} \right\}$$

$$\underset{\sim}{C} = \left\{ \frac{0\cdot4}{0\cdot5} + \frac{1}{0\cdot6} + \frac{0\cdot5}{0\cdot7} \right\}$$

Find the following :—

(i) Fuzzy Cartesian product $\underset{\sim}{P} = \underset{\sim}{V} \times \underset{\sim}{I}$

$\underset{\sim}{T} = \underset{\sim}{I} \times \underset{\sim}{C}$

$r = \underset{\sim}{P} \circ \underset{\sim}{T}$ (max–min)

$q = \underset{\sim}{P} \cdot \underset{\sim}{T}$ (max– product)

(b) What is meant by simulated anneling ? Explain Boltzman machine with its training phase. **8**

5. (a) Classify the given samples in to two cluster using Kohonen self-organizing map. (1100), (0001), (1000), (0011). Assume the learning rate as 0·2. **10**

(b) Using Perceptron learning rule, find the weights required to perform following classifications. Vector (1111) and (–1 ·1 –1 –1) are the members of first class. Vectors (111 –1) & (1 –1 –1 1) are the member of second class. Use two output neurons. Assume learning rate as 0·9 and initial weight of 0·25. Using training vectors, test the response of the net. **10**

6. (a) Explain the following terms : **10**

(i) Brain -state-in-a-box model.

(ii) ANFIS.

(b) Explain Genetic algorithm used for optimization with suitable example. **10**

7. (a) Draw and explain Discrete Hopfield network. **10**

(b) Explain Forward modeling and Inverse modeling in training the neural network. **10**

T.E. Electronic & telecommunication
Sem VI
Acoustics Engineering

29 Dec 2010

VT-Oct-10-4"

Con. 5825–10. (REVISED COURSE) GT–7629

(3 Hours) [Total Marks : 100

N.B. : (1) Question **No. 1** is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.
(3) Assume **suitable** data wherever **necessary**.

1. (a) Find the speed of sound in air at 20°C and one atmospheric pressure. Air has density 1·21 kg/m^3 and ratio of specific heats 1·402 at 20°C. **5**
   (b) Explain the term-acoustic reciprocity with reference to simple source. **5**
   (c) A room of 12 m x 10 m x 4 m has an average sabine absorptivity $\bar{a}$ = 0·1, find the reverberation time of room. **5**
   (d) Explain in brief the construction and working of moving coil electrodynamic microphone. **5**

2. (a) List out the properties of transducers which are used in radiation and reception of acoustic waves. **10**
   Explain any four properties of transducers in brief.
   (b) Show that the intensity of travelling wave $P = P_0 e^{-\alpha x} e^{j(wt-kx)}$ satisfies the equation $\frac{1}{I} dI/dx = -2\alpha$. **10**

3. (a) What are the methods of images ? **10**
   (b) Derive an expression for the instantaneous energy density for acoustic waves. **10**

4. (a) Explain the Helmholtz resonator. **10**
   (b) State and explain the fundamental properties of hearing. **10**

5. (a) What are acoustic factors in architectural design ? **10**
   (b) Explain the noise induced hearing loss and also give the permissible daily noise exposure limits for industrial noise recommended by OSHA. **10**

6. (a) Explain the calibration of receivers. **10**
   (b) What are the different types of loudspeaker cabinets. **10**

7. Write short notes on (any **two**) :– **20**
   (a) Piezo-electric microphone
   (b) Highway noise
   (c) Acoustic filters–Highpass and Lowpass.

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