DEC-2008

[3463] – 143

ADVANCED MICROPROCESSORS

T.E. (Electronics & E & T/C)

(2003 Course)

Time: 3 Hours Max. Marks: 100

Instructions : *1) Attempt 3 questions from Section – **I** and 3 questions from Section – **II**.*

*2) Answers to the **two** Section should be written in **separate** books.*

*3) Answer Q. **1** or Q. **2**, Q. **3** or Q. **4**, Q. **5** or Q. **6** from Section – **I**, Q. **7** or Q. **8**, Q. **9** or Q. **10**, Q. **11** or Q. **12** from Section – **II**.*

*4) Black figures to **right** indicate **full** marks.*

*5) Assume **suitable** data if **necessary**.*

SECTION – I

1. a) Write a program in COM format for addition of two numbers stored at location data 1 and data 2, result stored in data 3. State procedure to make executable (COM) file using MASM. **4**

   b) Name the interrupts which have priorities 0, 1, 2 and 3 state the range and location of interrupt vector table for 8086. **4**

   c) Explain role of directives EXTERN and PUBLIC in modular programming. **4**

   d) Write ASM program for addition of two BCD numbers. **4**

   OR

2. a) With suitable example explain difference between rotate and shift instructions. **4**

   b) Find physical address of location given by the instruction mOV AL, [SI] + 1234H.

   Assume CS:IP = 0100 : 0004H, DS = 0200H **2**

   c) Explain following debug commands

   i) Dump ii) Fill iii) Search iv) Un assemble **4**

   d) Write ASM program for 8086 processor for checking spellings of two words e.g. polish and police. Program should use repeat and string instructions and display message "spelling is correct" if these two words match otherwise display message "in correct spelling". **6**

P.T.O.

3. a) Explain call gate descriptor. What are the rules for using call gate descriptor ? How call gate is different from normal call ? Explain with suitable example. 6

b) What is need of Local descriptor ? Where they are located and how it is referenced ? 4

c) Define and explain DPL,CPL and RPL and its role in protection mechanism. 3

d) The base address of LDT is 0012 OOOOH and the GDT base address is 001 OOOOOH. If the value of selector loaded into CS register is 1007H.

i) What is the request privilege level ?

ii) Is segment descriptor in GDT or LDT ?

iii) What is the address of segment descriptor ? 5

OR

4. a) Explain following related to multitasking in 80386

i) Task descriptor

ii) TSS

iii) TR

iv) Bank link field. 6

b) Compare paging and segmentation and HS applications in virtual memory. 4

c) List features of virtual 86 mode of 80386. How it is different than real mode ? 4

d) If page directory entry of active page is F100 0007H and its page table entry is 01000 005H, what access is permitted to the user by 80386 ? 4

5. a) State the architecture requirements for implementation of VSB interface. 4

b) Explain in detail different transfer modes of USB. 6

c) With suitable block diagram explain IDE of hard disk. 6

OR

6. a) Draw block diagram of pentium mother board of p.c. 4

b) Write ASM program for 8086 processor to display string 'VIDEO' on screen at location Row O and col O using DOS/BIOS interrupt. Assume CGA mode for display. 4

c) Draw keyboard interfacing diagram to PC. 4

d) Explain 4 modes of operation of mouse. 4

SECTION – II

7. a) Explain U and V pipes and its functioning in pentium processor. **4**

   b) What is branch prediction ? How it is implemented in Pentium ? **4**

   c) 12-bite ADC is to be interfaced to parallel port of P.C.

      i) Draw interfacing diagram

      ii) Flow chart and Algorithm

      iii) 'C' program to show ADC readings on screen of PC. **8**

OR

8. a) State and explain features of pentium processor which give improvement over 8086. **6**

   b) Explain registers of UART (16550) which are involved in serial communication. **6**

   c) State advantages of PCI bus over EISA bus. **4**

9. a) What is TSR program ? Explain Dos INT 21H services used for TSR. Draw flow chart and algorithm for writing TSR program to generate beep when key is pressed. **6**

   b) Describe process control block in detail. **4**

   c) Explain briefly any four scheduling methods. **6**

OR

10. a) What is device driver ? Explain its structure. **6**

    b) Explain any two services of O.S. for interprocess communication. **6**

    c) Differentiate between process and thread and compare two on implementation point of view. **4**

11. a) State the features of LPC 21XX micro controller in following context

        i) Flash memory and RAM

        ii) I/O parts and ADC supper

        iii) Timers and its modes

        iv) Serial interfaces. **4**

b) Write a program for ARM processor in ASM for copying of data from block 1 to Black 2 using auto indexing mode. **4**

c) Explain bits and its function in CPSR. What is need of SPSR ? **4**

d) State exceptions and its vecter addresses of ARM processor. Explain difference between prefetch abort and data abort. **6**

OR

12. a) Explain with example following instruction STMFD r_{13}!, ($r_0 - r_2$, r_{14}). **4**

b) Using conditional instruction write program for compare number with '5', if not equal add this value to r_1 register and IF equal subtract this value from r_1. **4**

c) Write a program in 'C' for flashing LED connected to one of lines (P0.0) OF Lpc 21 XX ARM controller. Assume suitable delay. **4**

d) State and explain various modes of operation of ARM processor. **6**

POWER ELECTRONICS
Branch: T.E. (EPTC)
(2003 Course)

Time: 3 Hours Max. Marks: 100

Instructions: *i) Answer **any three** questions from **each** Section.*
*ii) Answer **three** questions from Section **I** and **three** questions from Section **II**.*
*iii) Answers to the **two** Sections should be written in **separate** books.*
*iv) **Neat** diagrams must be drawn **wherever** necessary.*
*v) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is **allowed**.*
*vi) Assume suitable data, **if necessary**.*

SECTION – I

1. a) Explain the two transistor analogy for an SCR and derive an expression for the anode current in terms of the current gains and leakage current of the transistors. **6**

   b) With the help of circuit diagram and relevant waveforms explain UJT trigger ramp and pedestal control mehtod of SCR. Give its advantages. **10**

OR

2. a) Calculate the values of snubber components R and C in figure 1 to protect SCR from reapplied dv/dt, if dv/dt rating of SCR is 100V/μsec. **6**

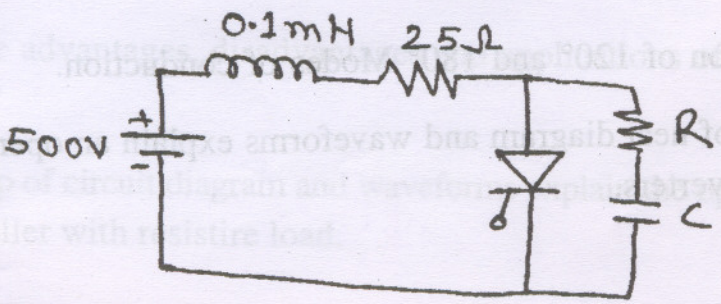

Figure 1

b) Draw the vertical cross section of a power MOSFET and explain the following: **10**

i) Reason for "body-source-short" in MOSFET structure.

ii) Presence of integral reverse diode in the structure.

3. a) Write short note on: Effect of source impedance of performance of LCC. **6**

b) Draw the circuit diagram and derive expressions for the average output voltage and overlap angle for a single phase fully controlled bridge rectifier with source inductance, with waveforms. **10**

OR

4. a) i) Compare freewheeling diodes and feedback diodes. **6**

ii) Give advantages of 3ϕ supply over 1ϕ supply.

b) With the help of circuit diagram and waveforms, explain the operation of three phase semiconverter for 'R' load for $\alpha = 0°$, $30°$, $60°$ and $90°$. **10**

5. a) The single phase quasi-square wave bridge inverter operates from a DC supply of 200V at a frequency of 100Hz and feeds a resistive load of 10Ω. Calculate

i) Duration of the ON period if the rms of the load voltage is 100V.

ii) Peak supply current.

iii) Average (DC) supply current. **9**

b) With the help of a circuit diagram and relevant waveforms explain the working of a 1ϕ full bridge inverter with resistive load. Also derive an expression for the rms value of the n^{th} harmonic output voltage. **9**

OR

6. a) Give comparison of 120° and 180° Modes of conduction. **6**

b) With the help of neat diagram and waveforms explain an operation of 180° mode of 3ϕ inverters. **12**

SECTION – II

7. a) A step-down chopper feeds a level load for a 200V DC supply. If the resistance of level load is 10Ω. Calculate the range of average and rms values of the supply current for duty cycle variation of 25% to 75%. **8**

   b) With the help of a circuit-diagram and waveforms, explain the operation of 'type C' two quadrant chopper feeding a DC motor load. **8**

OR

8. a) What are the advantages of resonant converters over switched mode converters? Give classification of resonant converters. **6**

   b) Draw the neat circuit diagram, waveforms and explain the operation of SLR DC to DC converter for discontinuous current conduction mode. **10**

9. a) With the help of circuit diagram and relevant waveforms explain the working of a triac based AC phase angle control circuit. When and why would it be desirable to replace triac by back to back SCRs ? **8**

   b) A single phase half wave a.c. voltage controller has a resistance load of R = 5Ω and input voltage Vs = 120V, 60Hz. The delay angle of thyristor is $\alpha = \frac{\pi}{3}$. **8**

   Determine :

   i) rms output voltage

   ii) input power factor

   iii) average input current.

OR

10. a) What are the advantages, disadvantages and applications of 3ϕ voltage controllers ? **6**

    b) With the help of circuit diagram and waveforms explain the operation of 3ϕ full wave controller with resistire load. **10**

11. a) An online UPS is driving 800W, 0.8 lagging PF load, an inverter efficiency is 80% and dc link voltage and battery voltage is 48V dc. Assuming batteries are ideal, **9**

Find i) VA rating of an inverter

ii) Wattage or peak power requirement of rectifier

iii) AH capacity of batteries required for backup time of 30 minutes.

b) Draw the circuit diagram and waveforms for speed control of separately excited DC motor. **9**

OR

12. Write short notes on **any three** : **18**

i) Electronic ballast for fluorescent lamps.

ii) Induction Heating.

iii) HVDC Transmission.

iv) HVAC Transmission.

DIGITAL SIGNAL PROCESSING

Branch : T.E. (Electronics/E&TC)

(2003 Course)

Time : 3 Hours Max. Marks : 100

Instructions: *1) Answer **3** questions from Section **I** and **3** questions from Section **II**.*

*2) Answers to the **two** Sections should be written in **separate** books.*

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*4) Use of electronic pocket calculator is **allowed**.*

*5) Assume suitable data, **if necessary**.*

SECTION – I

1. a) An interconnection of LTI systems is shown in figure (1). The impulse responses are $h_1[n] = \left(\frac{1}{2}\right)^n [u[n] - u[n-3]] h = [n] = \delta[n]$ and $h_3[n] = u[n-1]$.

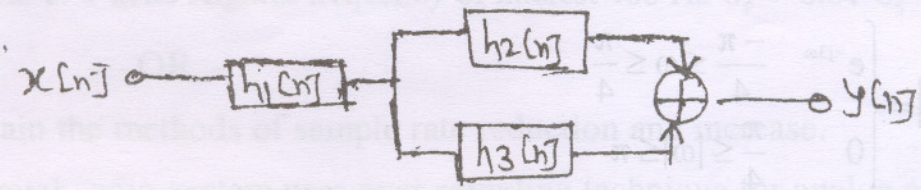

Figure 1

Express overall impulse response in terms of $h_1[n]$, $h_2[n]$ and $h_3[n]$. Also evaluate it. **10**

b) Determine inverse z transform of $X[z] = \frac{1}{(1+z^{-1})(1-z^{-1})^2}$ ROC $|z| > 1$. **8**

OR

2. a) Explain meaning of ROC. How it is important in determining causality and stability of system. 6

b) Find z transform of $x[n]=\left(\frac{1}{2}\right)^n [u[n]-u[n-10]]$. 6

c) Explain the design steps of analog buttorworth filter approximation. 6

3. a) Explain relationship of DFT with (i) z transform (ii) DTFT. 6

b) Compute 8-point DFT of the sequence x [n] = [0, 1, 2, 3], sketch magnitude and phase plot also. 10

OR

4. a) Find linear and circular convolution of the following sequences

x_1 [n] = [4, –2, 2, 1]

x_2 [n] = [1, 2, 3]. 6

b) Explain in detail DIT-FFT algorith. Draw flow graph for 8 point DFT. 10

5. a) Design FIR filter with

$$H_d\left[e^{j\omega}\right]=\begin{cases} e^{-j3\omega} & \frac{-\pi}{4}\le\omega\le\frac{\pi}{4} \\ 0 & \frac{\pi}{4}\le|\omega|\le\pi \end{cases}$$

using Hanning and Hamming windows with N = 7. 10

b) Explain Gibb's phenomenon. 6

OR

6. a) Explain in detail frequency sampling method of designing FIR filter. 8

b) Obtain the system function and draw direct form-II and parallel structure of the filter.

y [n] = 0.7 x [n] – 0.21 x [n – 2] – 0.1 y [n – 1] + 0.7 y [n – 2]. 8

SECTION – II

7. a) Compare FIR and IIR filters. **4**

   b) Design Chebyshev filter to meet the following specifications.

   $\frac{1}{2}$ dB ripple in passband $0 \leq |\omega| \leq 0.24.\pi$.

   minimum 50 dB attenuation in stop band $0.35\pi \leq |\omega| < \pi$ use bilinear transformation with T = 1 sec. **12**

OR

8. a) Explain application of IIR filter in speech and voice processing. **8**

   b) The system function of analog filter is given as

   $$Ha(S) = \frac{2}{(S+1)(S+2)}.$$

   Obtain the system function of digital IIR filter by using impulse invariance technique (Assume T = 1 sec). **8**

9. a) What is sub-band coding ? How it is achieved with multirate DSP ? **6**

   b) Design a three stage decimator that is used to reduce sampling rate from 96 kHz to 1 kHz. Highest frequency of interest 400 Hz $\delta_P = 0.01$ $\delta_S = 0.001$. **12**

OR

10. a) Explain the methods of sample rate reduction and increase. **6**

    b) A digital audio system uses over sampling technique for analog anti-imaging filter. The overall filter specifications for system are as : **12**

    Pass band 0 – 20 kHz

    Input sampling frequency f_s = 44.1 kHz

    Output sampling frequency = 176.4 kHz

    Stop band attenuation = 50 dB

    Pass band ripple = 0.5 dB

    Transition width = 2 kHz

    Stop band edge frequency = 22.05 kHz

    Design a suitable inter polator.

11. a) What is effect of co-efficient quantization of FIR and IIR filters ? **8**

b) Explain round off errors in 8 point radix – 2 DIT FFT. **8**

OR

12. a) Explain in brief the following functional units in DSP processor.
(i) Barrel shifter (ii) DAGs (iii) MAC. **8**

b) Find effect of quantization as pole-zero locations of the system function, in direct and parallel form given by $H[z]=\frac{1-z^{-1}}{(1-0.2z^{-1})(1-0.5z^{-1})}$. **8**

ELECTROMAGNETIC WAVES AND RADIATING SYSTEMS

T. E. (E & TC/Electronics)

(2003 Course)

Time : 3 Hours | Max. Marks :100

Instructions : *1) Answers to the **two** Sections should be written in **separate** books.*

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*4) Assume suitable data **if necessary**.*

*5) Use of logarithmic tables, slide rule, electronic pocket calculator is **allowed**.*

*6) Attempt Q. **1** or **2**, Q. **3** or **4**, Q. **5** or **6** from Section **I** and Q. **7** or **8**, Q. **9** or **10**, Q. **11** or **12** from Section **II**.*

SECTION – I

1. a) Define Electric field intensity and Electric flux density. Derive the expression for $\bar{E}$ using coulomb's law of force. **8**

   b) State and prove Gauss's law. **8**

   OR

2. a) Derive the boundary conditions at an interface between two magnetic media. **8**

   b) What is Laplace equation ? Derive expression for parallel plate capacitor using Laplace's equation. **8**

3. a) Define Poynting vector. State it's significance. Derive the expression for Poynting vector $\bar{P}$. **8**

   b) The conduction current flowing through a copper wire of cross-sectional area 2×10^{-5} m^2 is 3 A. if $\mu = 4\pi \times 10^{7}$ H/m, $\varepsilon = 8.854 \times 10^{-12}$ and $\sigma = 5.8 \times 10^{7}$ $\mho$/m. Find the displacement current at f = 1 GHz. **10**

   OR

4. a) State and explain Maxwell's equations in differential, integral and scalar forms. **8**

b) The electric field of a uniform plane wave propogating in a sea water [$\sigma = 4$ ℧ / m, $\varepsilon = 80\ \varepsilon_0$ and $\mu = \mu_0$] in the positive Z - direction is given at Z = 0, $\bar{E} = \text{Cos}\ (5 \times 10^4\ \pi t)\ \hat{a}\,x$ V/m.

Calculate :

i) The instantaneous power flow per unit area normal to the z - direction as a function of Z.

ii) Average power flow per unit area normal to the z – direction as a function of Z. **10**

5. a) Derive an expression for plane waves in lossless dielectric medium. **8**

b) Given that the electric field intensity of an electromagnetic wave in a non-conducting dielectric medium with permittivity $\varepsilon = 9\varepsilon_0$ and permeability μ_0 $\bar{E}\ (z, t) = \hat{a}y\ 5\ \text{Cos}\ (10^9\ t - \beta z)$ V/m. Find the magnetic field intensity $\bar{H}$ and B. **8**

OR

6. a) Define and explain in detail. **8**

i) Velocity of propogation

ii) Wave impedance

iii) Depth of penetration

iv) Group velocity

b) An $\bar{E}$ field in free space is given as, $\bar{E} = 800\ \text{Cos}\ (10^8\ t - \beta y)\ \hat{a}_z$ V/m.

Find

i) β

ii) λ

iii) $\bar{H}$at P (0.1, 1.5, 0.4) at t = 8 n sec. **8**

SECTION – II

7. a) Explain the following terms :

i) Reflection

ii) Reflection coefficient

iii) Standing wave ratio – VSWR, ISWR

iv) Characteristics impedance (Z_0). **8**

b) The open and short circuit impedances of a certain open wire transmission line of 40 km length at 796 H_z are Zoc = 328 L – 29.2° Ω and Z sc = 1548 L – 6.8° Ω.

Calculate values of Z_0, α, β, R, L, G, C. **10**

OR

8. a) Derive the expression for characteristics impedance (Z_0) and propagation constant (γ) in terms of primary constants of a transmission line. **8**

b) A thirty km long open wire transmission line is supplied by a generator of 2 V, 600 Ω and loaded with (300 + j 400) Ω impedance. The frequency is 1 kHz. Find

i) Values of Is, I_R and E_R

ii) Reflection coefficient

Assume the following line constants per km. R = 4.11 Ω, L = 31.1 mH, C = 99 pF, G = 0.14 μ ℧. **10**

9. a) Show that the radiation resistance of a Hertzian dipole $80\pi^2\left(\frac{dL}{\lambda}\right)^2$. **6**

b) Explain the following terms related to antenna

i) Field radiation pattern

ii) Directivity

iii) Directive gain

iv) Radiation resistance

v) Antenna efficiency. **10**

OR

10. a) Explain the following :

i) Antenna polarization

ii) Antenna feeding techniques. **10**

b) A dipole carries RMS current of 100 A at 150 MHz. It's length is 1 m. Calculate

i) Power radiated by antenna

ii) Effective height of antenna

iii) Directive gain of antenna. **6**

11. a) Find the current required to radiate a power of 100 w of 100 MHz from 0.1 m Hertzian dipole. Also find magnitude of electric field at r = 100 m and $\theta = 90°$. **8**

b) Compare end fire array and broadside array. **8**

OR

12. a) Explain in detail Broadband Antenna. **8**

b) Four antenna elements are arranged in broadside array with separation of $\lambda/4$. Sketch radiation pattern. **8**

INFORMATION THEORY AND CODING TECHNIQUES

Branch : T.E. (E & TC)

(2003 Course)

Time : 3 Hours Max. Marks : 100

Instructions : *1) Answer **3** questions from Section **I** and **3** questions from Section **II**.*
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SECTION – I

1. a) A discrete source emits one of five symbols once every millisecond. The symbol probabilities are $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}$ and $\frac{1}{16}$ respectively. Find the source entropy and Information Rate. **(8)**

   b) Write a short note on: **(8)**

   1) Data compaction

   2) Shannon Source Coding Theorem.

OR

2. a) Consider a DMS with source probabilities { 0.20, 0.20, 0.15, 0.15, 0.10, 0.10, 0.05, 0.05 } **(8)**

   1) Determine an efficient fixed length 'R' of the code words.

   2) Determine the Huffman code for this source.

   3) Compare the two codes and comment.

b) Determine the Lempel-Ziv code for the following bit stream. **(8)**

0100111110010100000 10101011 00110000

Recover the original sequence from the encoded stream.

3. a) Find capacity channel whose channel matrix is given as **(8)**

$$P[Y/X] = \begin{bmatrix} 1-P & P & 0 \\ 0 & P & 1-P \end{bmatrix}$$

a) Draw channel diagram.

b) Find output probabilities of inputs are equally likely and P = 0.2.

b) Explain the sphere packing problem. **(8)**

OR

4. a) An ideal communication system with average power limitation and white Gaussian Noise has a Bandwidth of 1 MHz and Signal/Noise ratio is 10.

1) Determine channel capacity.

2) If S/N ratio drops to 5, what B.W. is required for same channel capacity ?

3) If B.W. is decreased to 0.5 MHz, what S/N ratio is required to maintain same channel capacity ? **(8)**

b) Explain SHANNON FANO and HUFFMAN Algorithm with suitable example. **(8)**

5. a) Explain FFC and ARQ in detail. **(6)**

b) Consider a (7, 4) Linear Block Code whose generator matrix is given by **(12)**

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

1) Find all code words.

2) Find parity check matrix.

3) What is the minimum distance of this code ?

4) How many errors can this code detect ?

5) Write down the set of patterns, this code can detect.

6) Is this a linear code ?

OR

6. a) Suggest a suitable generator polynomial for a (7, 4) systematic cyclic code and find code words for the following data words

1) 1010 (2) 1111 (3) 0001 4) 1000 **(10)**

b) Explain with suitable example, circuit implementation of cyclic code. **(8)**

SECTION – II

7. a) Explain the following terms in connection with the convolution codes : **(6)**

1) Code Rate and Constraint length

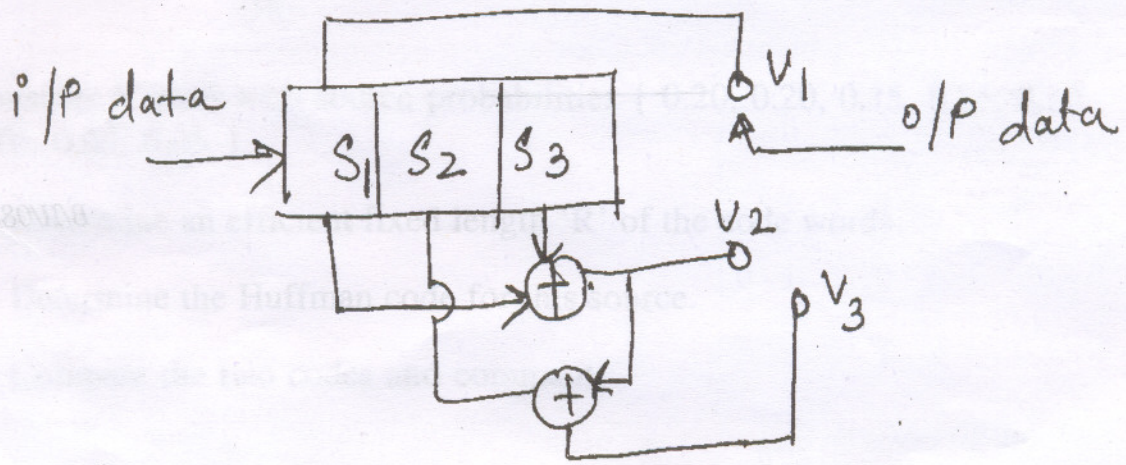
2) Steady State Transition

3) Termination of Trellis diagram

b) Design (3, 1) cyclic repetition code and its decoding method. Find corrected code words for (1) 010 (2) 110. **(10)**

OR

8. a) For the convolutional encoder shown, sketch the state diagram and Trellis diagram. Find the output data sequence for the i/p data sequence 10110. **(10)**



b) Explain Viterbi algorithm with suitable example. **(6)**

9. a) Design a [15, 11] RS code. Find code whose message polynomial is given as (x + 1). **(8)**

   b) What are the features of BCH code ? What are the features of RS code ? **(8)**

OR

10. a) What is cryptography technique ? Explain secret key cryptography technique in detail. **(8)**

    b) What is JPEG ? What are its standards ? Explain the DCT image compression schemes. **(8)**

11. a) What are the different Multiple Access Techniques ? Explain in detail. **(6)**

    b) Explain free space propagation model for Radio Link design. **(6)**

    c) What are the wireless communication standards ? Explain IS – 95 Std in detail. **(6)**

OR

12. a) Explain : **(8)**

    1) Frequency Reuse and polarization

    2) Satellite Transponder

    3) Earth station

    b) Explain in detail with analysis satellite system power budget. **(10)**
