

TE (SEM V) NOV. DEC 2013
(ETRX) MPMC-I

02/12/13

44 : 2nd half.13-Avi(at)

Con. 6796-13.

LJ-11338

(3 Hours)

[Total Marks : 100

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

Q.1. a) Design 8085 based system with following specifications.

Draw detail interface diagram.

- i) CPU operating at 3 Mhz
- ii) 16KB EPROM using 4 KB devices
- iii) 32KB RAM using 8 KB devices

Give its memory mapping & I/O mapping and use absolute decoding approach. 15 marks

b) Explain addressing modes with example of 8085 microprocessor 5 marks

Q.2. a) Explain the Interrupt structure of 8085 microprocessor 10 marks

b) Explain with block diagram interfacing of 8255 PPI and 8085 microprocessor with control word for data transfer in handshake mode . 10 marks

Q.3. a) Draw timing diagram for: i) Opcode fetch ii) Memory read

iii) I/O read 6 marks

b) Explain SIM & RIM instructions of 8085 microprocessor 4 marks

b) Explain interrupt structure of 8051 microcontroller 10 marks

Q.4. a) Explain following instructions used in ARM with one example each.

i) LDM/STM ii) BIC iii) ADD/SUB

iv) MVN v) BEQ 10 marks

b) Explain the CPSR register of ARM processor 5 marks

c) Explain the flag register of 8085 microprocessor 5 marks

Q.5. a) Write a program to generate square wave of 1 KHz frequency

using 8155 timer . (Timer operating at 3 MHz) 10 marks

b) Write a program to multiply two numbers for 8085 microprocessor

10 marks

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Q.6. a) Draw & Explain block diagram of 8259 peripheral IC 10 marks

b) Explain addressing modes with example of 8051 microcontroller 10 marks

Q.7. write a short note on

a) TCON & TMOD registers of 8051 Microcontroller

b) Addressing modes of ARM processor

c) Stepper motor interfacing with 8051 microcontroller.

(3 Hours)

[Total Marks : 100

- N.B.:** (1) Question 1 is compulsory.
 (2) Solve any four out of remaining six.
 (3) Assume suitable data wherever necessary.

1. Solve any four:-

20

- (a) Explain relationship between fourier transform and laplace transform of a signal.
- (b) Classify the system on the basis of stability and causality $y''(t) - 2t y'(t) = \chi(t)$
- (c) Define ESD and PSD. What is the relation of ESD and PSD with outo correlation?
- (d) Determine signal energy and signal power for $f(t) = e^{-5t}u(t)$
- (e) State the following properties of fouries Transform.
- Linearity
 - Time shifting
 - Frequency shifting
 - Scaling
 - Time Differentiation

2. (a) LTI System is given by

$$\frac{d^2y}{dt^2} - \frac{dy}{dt} - 6y(t) = \chi(t)$$

- Find (i) Transfer function
 (ii) Impulse response
 (iii) Step response

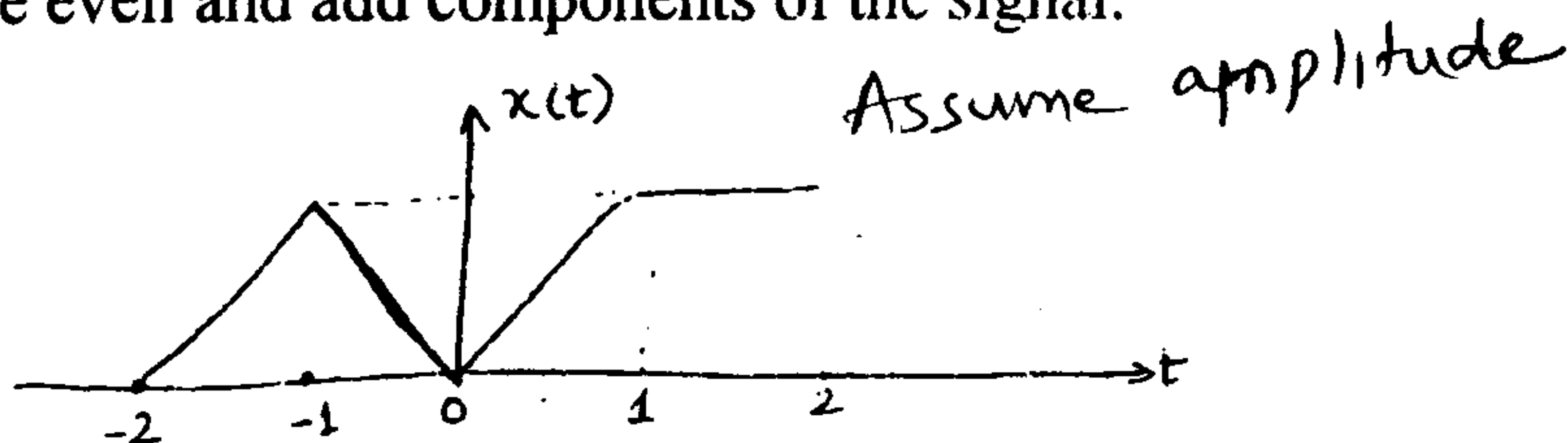
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4

4

(b) Determine even and odd components of the signal.

10



3. (a) What is the PDF OF Uniform, Exponential and Gaussian. Distribution?

10

TURN OVER

Con. 7038-LJ -11374-13.

2

- (b) Obtain Inverse Laplace transform of

10

$$x(s) = \frac{4}{(s+1)(s+2)^2}$$

for all possible region of convergence.

4. (a) Convolve the following signal

10

$$x(s) = e^{-1}u(t); h(t) = e^{-2t}u(t)$$

- (b) State the initial value and final value theorem. Find initial value and final value, if they exist, of the signal with Laplace Transform given below

10

$$x(s) = \frac{s^2 + 8s + 7}{s^2 + 3s + 2}$$

5. (a) What are random functions. Explain moments of random functions with suitable example.

10

- (b) A LTI system is given by

10

$$\frac{d^2y}{dt^2} + \frac{5dy}{dt} + 6y(t) = 2\chi(t)$$

with $y(0) = 2, y'(0) = 4$ and $\chi(t) = u(t)$

- Find (i) Zero Input Response.
-
- (ii) Zero State Response.
-
- (iii) Total Response.

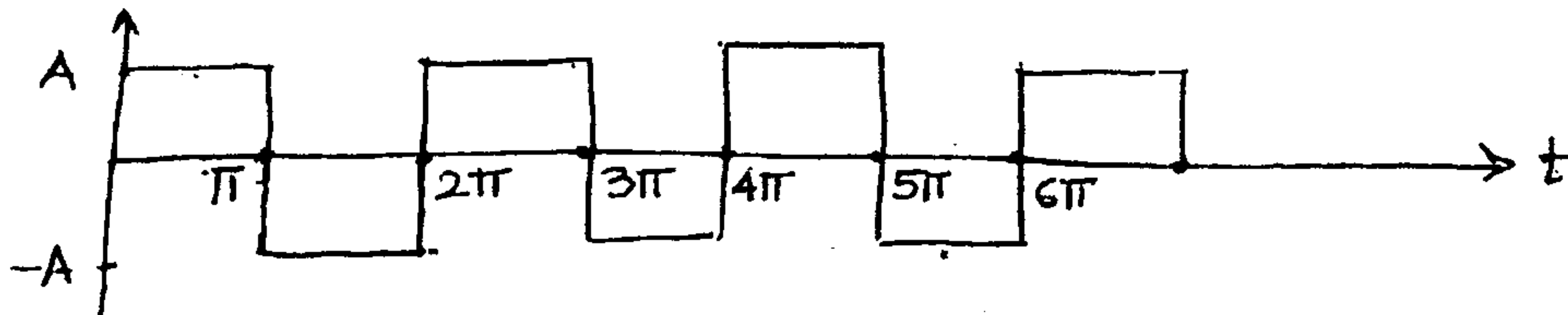
6. (a) Obtain state variable model of continuous time LTI system describe by differential

10

$$\text{equation. } \frac{2d^2y}{dt^2} + \frac{3dy}{dt} + 6y(t) = 2\chi(t)$$

- (b) Find trigonometric fourier series of the following function.

10



7. Write short notes on (any four)

20

- (i) Parseval's Relation
 - (ii) DIRICHLET'S condition
 - (iii) Random Process
 - (iv) Gibb's phenomena
 - (v) Rayleigh's Energy theorem
-

(3 Hours)

[Total Marks : 100]

N.B. : (1) Question 1 is **compulsory**.(2) **Attempt** any **Four** Questions out of remaining **six** Questions(3) **Assume** any **suitable data** wherever **required** but justify the same.

1. Answer the following questions :- 20
- State & Explain Random Variables, Mean and Variance of Random Variable.
 - MSK signal is shaped QPSK Signal. Justify giving expression for MSK and QPSK.
 - The binary data 1101101001 is applied to the input of a duobinary system with precoder. Construct the duobinary coder with output.
 - Differentiate between source coding and channel coding with example.
2. (a) Consider five message given by the Probabilities :- 10
- $$M = m_1 \quad m_2 \quad m_3 \quad m_4 \quad m_5$$
- $$P \quad \frac{1}{2}, \quad \frac{1}{4}, \quad \frac{1}{8}, \quad \frac{1}{16}, \quad \frac{1}{16}$$
- Calculate H (Entropy)
 - Use the Shannon - Fano algorithm to develop an efficient code and for that code calculate the average number of bits message compare with H.
- (b) A discrete memoryless source has an alphabet of five symbol with their probabilities as shown 10
- | Symbol | S1 | S2 | S3 | S4 | S5 |
|---------------|------|------|------|------|------|
| Probabilities | 0.15 | 0.11 | 0.19 | 0.40 | 0.15 |
- Construct Huffman code and calculate code efficiency and redundancy of the code.
 - Repeat the same for arranging Probabilities in ascending order. Compare both the results.
3. (a) Compare between offset QPSK and Non-Offset QPSK 5
- (b) Differentiate between Systematic and Non-Systematic cyclic code with suitable example. 5
- (c) Does channel bandwidth requirement reduce by a factor of four in QPSK compared to BFSK? 5
- (d) A rate $1/3$, $K = 3$ convolutional encoder can be described by the impulse response of the path given by 5
- $$g_1 = 110, g_2 = 101, g_3 = 111$$
- Draw the encoder and construct the state diagram.

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4. (a) consider a (7, 4) linear block code with 10
- $$P_1 = m_4 + m_5 + m_6$$
- $$P_2 = m_5 + m_6 + m_7$$
- $$P_3 = m_4 + m_5 + m_7$$
- (i) Design the encoder
(ii) List all the code word
(iii) What is the error correcting capacity?
(iv) Find the code word for message 1001
- (b) Find the generator matrix G for a systematic (7,4) cyclic code using generator 10
Polynomial $g(x) = x^3 + x^2 + 1$. Design an encoder for this code and verify its operation using the message vector (1100).
5. (a) The binary sequence 0010100101101 is applied to a DPSK transmitter. Draw the 6
block diagram of DPSK transmitter and sketch the resulting waveform at the transmitter output.
- (b) Derive and sketch power spectral density of Polar NRZ signal. Hence sketch the 10
Power Spectral density of BPSK signal and obtain bandwidth.
- (c) With relevant expression, compare the performance of M-ary FSK and M-ary PSK 4
in terms of bandwidth efficiency and Noise immunity.
6. (a) Compare between slow freq. hopping and fast frequency hopping with relevant 10
wave form assume any suitable data & PN sequence for the same.
- (b) Define Antijam characteristics of Spread Spectrum System. The direct Sequence 10
Spread Spectrum Communication System has following Parameters
- Data Sequence bit duration $T_b = 6.125$ ms
PN chip duration, $T_C = 1.5$ μ s
- Probability of error less ~~than~~ ^{than} 10^{-5} $\left(\frac{E_b}{N_0} = 10 \right)$
- Calculate processing gain and jamming margin. 20
7. Write short notes on any **Four**
- (i) ISI and Eye-diagram
(ii) Matched filter
(iii) Comparison of M-FSK with M-PSK
(iv) Central Limit Theorem
(v) DS-CDMA
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T.G. ESTRY Sem V ~~2013~~

Sub - EE.

21 | Nov | 13

07-11-13\riddhi\1

Con. 6751-13.

LJ-11257

(3 Hours)

[Total Marks :100

N.B. : (1) Question No. 1 is compulsory.

(2) Attempt any four questions from Question nos. 2 to 7.

(3) Vector Notation should be used wherever necessary.

(4) Assumptions made should be clearly stated.

1. (a) Define characteristic impedance of transmission line. What is intrinsic impedance of free space? 5
- (b) Write a note on Smith Chart. 5
- (c) Derive wave equations for time harmonic fields. 5
- (d) In free space $\vec{E} = 10e^{j(\omega t - 4x)} \hat{a}_y$ v/m. Find \vec{H} . 5
2. (a) Explain power flow due to time varying fields. Derive Poynting Vector. 10
- (b) Explain impedance matching in detail. 10
3. (a) A telephone wire 20 km has following constants per km; $R = 90\Omega$, $C = 0.062\text{PF}$, $L = 0.001\text{H}$ and leakage $= 1.5 \times 10^{-6} \text{ J/km}$. The line is terminated at its characteristic impedance. A potential difference of 2.1 V having frequency of 1000 Hz is applied at sending end. Calculate : (i) The characteristic impedance (ii) Wavelength (iii) The velocity of propagation. 10
- (b) Find transmission and reflection coefficients at boundary for normal incidence. 10
For region 1 $\epsilon_{r1} = 9$, $\mu_{r1} = 1$ and $\sigma_1 = 0$. Region 2 is free space. Assume perpendicular polarization
4. (a) Explain potential functions for sinusoidal radiation oscillations. 10
- (b) What is polarization of electromagnetic wave? Explain linear, circular and elliptical polarization. 10
5. (a) Derive the wave equation for source free regions. Show that a uniform plane wave \vec{E} and \vec{H} are perpendicular. 10
- (b) Define input impedance of transmission line. Derive expressions for short and open circuit impedance of two wire transmission line. 10
6. (a) Explain pulse broadening in dispersive media. 10
- (b) Explain different sources of EMI. Discuss the need of electromagnetic compatibility. 10
7. Write brief notes on : 10
 - (a) Electrostatic discharge
 - (b) Maxwells equations in Integral form
 - (c) Laplace's and Poisson's equations
 - (d) Radiation resistances of Hertzian dipole of length $\lambda/40$, $\lambda/60$ and $\lambda/80$.

(3 Hours)

[Total Marks : 100

N.B. : (1) Question No. 1 is **compulsory**.(2) Total **five** questions **need** to be solved.1. Solve any **five** :-

- (a) Explain Basic Op-amp configurations and give maximum Ratings of IC 741. 4
- (b) Explain CMRR measurement procedure with examples. 4
- (c) Explain voltage to frequency converter circuit. 4
- (d) Explain first order Active filter circuit. 4
- (e) If voltage increase greater than +3 volt then output is **on state**. If input voltage decrease than +3 volt then output is **off state**. 4
- I/P from given 10K Ω pot
- O/P Operates 12 volt Relay.
- (Draw the circuit diagram)
- (f) Explain Analog Switch Applications with examples. 4
- (g) Explain why Astable multi-vibrator using IC-555 is Asymmetrical. 4

2. (a) Explain how to measure Input Bias current and offset current with diagram and also explain error compensation circuit for the same. 10

- (b) (i) Explain stability problem in IC 741. 5
- (ii) Explain stability in constant GBP - Op-amp circuit. 5

3. (a) Derive the Instrumentation Amplifier with circuit diagram. 10

(b) Design $V_o = V_1 + V_2 - V_3$ using IC 741. 10

4. (a) Explain Design steps for frequency response of 2nd order L.P.F. with diagram, waveforms if cut off frequency is 10KHz. 10

(b) Compare 1st order filter and 2nd order filter and explain cascade design in filter with examples. 10

5. (a) Write down the Advantage of Precision Rectifier, explain with circuit diagram, waveform. 10

(b) Design Triangular waveform generator with IC 741 :- 10

$$T_{ON} - 1010 \mu s$$

$$T_{OFF} - 2020 \mu s$$

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Con. 9452-LJ-11297-13.

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6. Solve any two :-

- (a) Design flash type 2 bit A/D converter using LM 324. **10**
- (b) Design 4 voltage regulator using IC 723. **10**
- (c) Explain functional block diagram of voltage regulators. **10**

7. (a) (i) Compare RC phase shift and Wein bridge oscillator. **5**
- (ii) Explain Application of PLL. **5**
- (b) Explain 555 Timer Internal Block diagram. **10**
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T-E. Sem - IV
 ETRX, CMPN, IT, EXTC.

18/12/2013.

Con. 7101-13.

LJ-11450

(2 Hours)

[Total Marks : 50

- N. B. :** (1) Question No. 1 is **compulsory**.
 (2) Attempt any **four** questions from Question Nos. 2 to 7.
 (3) Draw **suitable** sketches wherever **required**.
 (4) **Figure** to the **right** indicates **full** marks.

1. Answer any **five** of the following:— **10**
 - (a) Explain the concept of food chain with suitable example.
 - (b) What are the causes and effects of E-pollution?
 - (c) Differentiate between : Renewable and Non-renewable energy resources.
 - (d) What is sustainable development? What are its benefits?
 - (e) Explain the term 'Hot Spots of Biodiversity'.
 - (f) What are the functions of State Pollution Control Board.
 - (g) Why thermal pollution is growing? How it can be controlled?

2. (a) Explain briefly the characteristic features of forest ecosystem. How forest ecosystem can be conserved? **5**
- (b) Why there is need for water conservation? Explain briefly how rain water harvesting can be carried out? **5**

3. (a) How marine pollution is caused? Explain adverse effects caused on account of it. **5**
- (b) What is disaster management? How these techniques can be implemented in the event of cyclone. **5**

4. (a) Explain briefly the salient features of Air Pollution Prevention and Control Act. **5**
- (b) Why global warming is taking place? What are the adverse effects produced by it? **5**

5. (a) What is Biodiversity? Explain the important values of biodiversity. **5**
- (b) How acid rain is formed? What adverse effects are produced on account of it. **5**

6. (a) What role is played by Information Technology to the field of human health and environment. **5**
- (b) Explain structural and functional aspects of an ecosystem. **5**

7. (a) What is solid waste? Explain the methods to control solid waste. **5**
- (b) List important air pollutants. What are their sources and how do they affect us? **5**