

QP Code : MV-18297

(3 Hours)

[Total Marks : 100

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

1. (a) Explain how processor performance can be enhanced by using pipelining. 5
(b) Explain any four principles that are used in RISC processor design. 5
(c) Explain, with a neat diagram, the principle of working of an optical disk. 5
(d) Explain modes of DMA transfer. 5
2. (a) Explain the working of super scalar architecture with example. 10
(b) Explain the various type of hazards in pipelined processors with example. Also, propose solutions for each type. 10
3. (a) Explain paging. State advantages of paging and highlight the function of the Translation look. Aside Buffer (TLB). 10
(b) Explain virtual to physical address translation. 10
4. (a) Contrast the difference between microprogrammed and hardwired control unit design. State clearly the advantages and disadvantages of each. 10
(b) Draw and explain (a) One way set associative and (b) Two way set Associative mapping for the following system :- 10
Main Memory = 4 MB
Cache memory = 32 KB
Line size = 4 bytes.
5. (a) Explain the various exceptions and how exception handling is performed in IA-32 architecture. 10
(b) Explain the register set of the ARM family. 10
6. (a) Explain techniques to improve the performance of the cache memory subsystem. 10
(b) What is cache coherency ? Explain various cache write policies. 10
7. Write short notes on (any two) :- 20
(a) RAID memories
(b) Cache Architectures
(c) Bus arbitration techniques.

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

1. (a) Define radiation resistance, beamwidth, bandwidth, polarisation, Directivity of an antenna. 5
(b) Why G-Y₀ is not transmitted in color TV transmission. 5
(c) Explain Blind speed in radar systems. 5
(d) Explain what is equatorial, polar and inclined orbits in satellite communication. 5
2. (a) What do you understand by half line discrepancy problem. How pre-equalising and post equalising pulses are used for remedy. 10
(b) Derive an expression for maximum radar range. Explain the factors affecting it. 10
3. (a) Explain MTI radar system with the help of Block diagram. How Doppler effect is used in MTI radar. 10
(b) What do you understand by frequency interleaving in colour TV system. 5
(c) With the help of block diagram. Explain satellite transponder. 5
4. (a) Draw and explain composite video signal for 3 line periods. What do you understand by pull on whites. 10
(b) Explain construction, radiation pattern, Design specifications of yagi-Uda antenna. 10
5. (a) Why vertical sync pulse in composite video signal is serrated. 5
(b) Draw and explain chromaticity diagram. 5
(c) Explain in detail the various losses in optical fiber cables. 10
6. (a) Calculate the beamwidth between nulls of a 2m paraboloid reflector used at 6 GHz. 5
(b) Justify the need of VSB modulation technique for picture transmission in TV. 5
(c) Explain the effect of ground on antenna's radiation pattern. Also differentiate between resonant and non-resonant antennas. 10
7. Write short notes on :—
 - (a) Kepler's laws of satellite motion 7
 - (b) PAL system. 6
 - (c) Types of Fibers. 7

TE (ETRX) : SEM: VI
(CRU) MDC

may 2014

13/5/14

QP Code : MV-18074

(3 Hours)

[Total Marks : 100

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

1. Answer any four :-

20

- (a) Why S parameters are used at microwave frequencies ?
(b) TEM waves do not propagate through hollow waveguide. Justify.
(c) An IMPATT diode has following parameters :-

Carrier drift velocity $v_d = 2 \times 10^7$ cm/s

Drift region length $L = 6 \mu\text{m}$

Maximum operating voltage $V_{0_{\text{max}}} = 100\text{V}$

Maximum operating current $I_{0_{\text{max}}} = 200$ mA

Efficiency $\eta = 15\%$

Breakdown voltage $V_{bd} = 90\text{V}$.

Find :-

- (i) The maximum power in watts.
(ii) The resonant frequency.
(d) What is back heating in microwave oscillator ?
(e) Differentiate between TE_{mn} and TM_{mn} modes in rectangular waveguides.

2. (a) Derive wave equation for TE wave and obtain all field components in rectangular wave guide. 12

(b) Define group velocity and phase velocity for wave propagating in rectangular waveguide. 8

A wave guide has cutt off frequency of 3.75 GHz. Find the group velocity for this rectangular waveguide at 5 GHz.

3. (a) With neat schematic diagram, explain the bunching of electrons in Reflex Klystron. Hence derive the expression for bunching parameter. 10

(b) A pulsed cylindrical magnetron is operated with following parameters :- 10

Anode voltage = 25 kV

Beam current = 25 A

Magnetic flux density = 0.34 wb/m²

Radius of cathode cylinder, $a = 5$ cm

Radius of vane edge to center, $b = 10$ cm

Calculate :-

- (a) The cyclotron angular frequency
(b) The cutt off voltage
(c) The cutt off magnetic flux density.

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4. (a) What are ferrite devices ? Explain with neat schematic circulator and mention its uses. **10**
- (b) Explain a method to measure VSWR at microwave frequencies when VSWR is greater than 10. **10**
5. (a) Explain the different operating modes of Gunn diode. **10**
- (b) With neat diagram explain the operation of Travelling Wave Tube. **10**
6. (a) Explain the operation of two hole directional coupler. Derive its S-matrix. **10**
- (b) Explain power frequency limitation in microwave transistors. **10**
7. Write short notes on (any four) :- **20**
- (a) Measurement of power
 - (b) Microwave resonator
 - (c) Magic TEE
 - (d) Striplines
 - (e) Applications of microwaves
-

(3 Hours)

[Total Marks : 100

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

Q1 a) Design the 8086 microcomputer system with the following specifications

- i) 8086 CPU operating at 5MHz
- ii) 8087 co-processor for numeric computation
- iii) 32 KB of EPROM using 8 KB devices
- iv) 64 KB of SRAM using 16k devices
- v) 2 input and 1 output port all are of 16 bits. 15 marks

b) Explain address modes of 8086 microprocessor 5 marks

Q. 2a) Draw and explain functional block diagram of 8257. Explain the bit configuration of mode set register and status register of 8257. 10 marks

b) Draw and explain the interfacing diagram of 8259 in maximum mode and cascaded mode with 8086 microprocessor 10 marks

Q3 a) Convert the decimal number -187.625 into short real, long real and temporary real data of 8087 NDP. 5 marks

b) Explain different 8087 exceptions 5 marks

c) Write function of the following 8086 microprocessor pins

- i) LOCK (bar) ii) QS0 & QS1 (bar) iii) MN/MX (bar)
- iv) TEST (bar) v) READY 10 marks

Q4 a) Explain the application of timer in PIC18F microcontroller 5 marks

b) Explain addressing modes of PIC 18F 5 marks

c) How the data memory and program memory is organized with PIC18F. Explain with the help of memory map. 10 marks

Q 5 a) write PIC 18F assembly program to blink a LED 10 marks

b) write a short note on : PIC 18 Reset 10 marks

Q 6 a) Write algorithm for bubble sort and an assembly language program to sort a given set of 8 bit unsigned integers into ascending order by bubble sort .

10 marks

b) write an assembly language program to find maximum number in the array of 12 numbers.

10 marks

Q. 7 Write short notes

a) Assembler directives for 8086

7marks

b) Handshaking mode of 8255 PPI

7 marks

c) Configuration of 8259 OCWS

6 marks

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(3 Hours)

[Total Marks : 100

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

1. Attempt any **four** of the following :-
 - (a) What is signal conditioning ? Why is it necessary in Data Acquisition System ? 5
 - (b) What are the basic requirements of a transducer. 5
 - (c) Define the term Accuracy and Precision. Give suitable example. 5
 - (d) What are different types of error ? 5
 - (e) Give need of Instrument calibration. 5
2. (a) Derive the expression for step response of first order instrumentation system and explain its response. 10
(b) Explain the construction, working principle and operation of Electromagnetic type of flow meter. 10
3. (a) What is LVDT ? State the specifications and Limitations of this transducer. Also compare RVDT with LVDT. 10
(b) Explain the working of Strain Gauge. Derive the expression of gauge factor for metal strain gauge. Also compare Semiconductor Strain Gauge with metal strain gauge. 10
4. (a) With the help of neat diagram explain the working of Instrumentation amplifier and derive its expression. Also explain its advantages. 10
(b) Explain window comparator ? Give its application. 10
5. (a) Explain multichannel Data Acquisition System to monitor temperature, pressure and Displacement measurement. 10
(b) Explain Distributed control system (DCS) with neat diagram. 10
6. (a) Explain in detail ON-OFF controller. Describe the importance of dead zone. 10
(b) Derive Expression for first order High Pass Filter. 10
7. Write short notes on any **three** :- 20
 - (a) Fire point calibration procedure
 - (b) pH measurement
 - (c) Current to voltage converter
 - (d) Feed forward controller
 - (e) Data Logger.

Discrete Time & signal & systems

QP Code : MV-18207

(3 Hours)

[Total Marks : 100

- N.B. : (1) Question no. 1 is compulsory.
 (2) Answer any **four** questions out of remaining **six** questions.
 (3) Figure to the right indicate **Full Marks**
 (4) Assume suitable data wherever required but justify the same.

1. (a) Express $x[n] = \{1, 2, 3, 4\}$ as sum of impulses. 5
 (b) Explain convolution sum. Prove that Z^n is a eigen signal of DT-LTI system. 5
 (c) What are the advantages of FFT over DFT with some suitable example. 5
 (d) Justify that discrete time harmonics are not always periodic 5

OR

What is the condition of causality and stability for a LTI system.

2. (a) The impulse response of a LTI system is $h(n) = \{1, \frac{2}{3}, 1, -1\}$. Determine the response of system to the input signal $x[n] = \{\frac{1}{3}, 2, 3, 1\}$ solve it in time domain. 10

- (b) By means of DFT/IDFT. Determine the sequence $x_3[n]$ corresponding to the circular convolution of the sequence $x_1[n] = \{2, 1, 2, 1\}$ and $x_2[n] = \{\frac{1}{3}, 2, 3, 4\}$. 10

3. (a) A LTI system is characterised by the system function 10

$$H(z) = \frac{3 - 4z^{-1}}{1 - 3.5z^{-1} + 1.5z^{-2}}$$

specify ROC of $H(z)$ and determine $h(n)$ for the following conditions.

- (a) For the system is stable.
 (b) The system is causal.
 (c) The system is anticausal.

- (b) Find the initial value and final value of each causal signal described by - 10

(a) $X(z) = \frac{Z^2}{(z-1)(z-0.8)}$

(b) $X(z) = \frac{Z^2}{(z+1)}$

(c) $X(z) = \frac{Z^2}{(z-0.4)(z-0.5)}$

4. (a) Consider a sequence $x[n] = \{1, 2, 1, 2, 0, 2, 1, 2\}$. Compute DFT using DIT, FFT Algorithm. 10

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- (b) Determine the unit step response of the system described by the difference equation - 10
 $y[n] - 0.5 y[n-1] = 2(0.25)^n x[n]$
 with $y[-1] = -2$. Determine zero input response and zero state response.
5. (a) Two sequences are given as $x_1[n] = \{1, 2, 3, 4\}$ and $x_2[n] = \{5, 6, 7, 8\}$. 10
 Also $x[n] = \{1 + 5j, 2 + 6j, 3 + 7j, 4 + 8j\}$. Compute $X[k]$ and find DFT of $x_1[n]$ and $x_2[n]$ using result only.
- (b) A LTI system is described by the difference equation 10
 $y[n+2] = x[n] + 5y[n+1] - 6y[n]$.
 Find - (a) a system function
 (b) Plot its magnitude and phase response
6. (a) Determine the impulse response for the cascade of two LTI systems 10
 having impulse responses,
 $h_1[n] = (\frac{1}{2})^n u[n]$
 $h_2[n] = (\frac{1}{4})^n u[n]$
- (b) Determine the cross-correlation sequence of the sequences 10
 $x[n] = \{\dots, 0, 0, 2, -1, 3, 7, \frac{1}{4}, 2, -3, 0, 0, \dots\}$
 $y[n] = \{\dots, 0, 0, 1, -1, 2, -2, \frac{4}{3}, 1, -2, 5, 0, 0, \dots\}$
7. Write short notes on any four :- 20
- (a) Properties of DTFT
 - (b) Properties of autocorrelation and cross correlation
 - (c) Power density spectrum and Parseval's relation
 - (d) Overlap add and save method.
 - (e) DSP Processors.
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(3 Hours)

[Total Marks : 100

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

1. (a) Differentiate between gate characteristics and V-I characteristics of SCR. 5
(b) Justify the use of freewheeling diode in controlled rectifier improves the power factor. 5
(c) What do you understand by $\frac{di}{dt}$ and $\frac{dv}{dt}$ ratings of SCR. What is the effect on SCR if they are exceeded. 5
(d) Draw and explain the DC circuit breaker for SCR. 5
2. (a) What is the difficulty if SCRs connected in series. State and explain different kinds of equalising network with their design criterion. 10
(b) Draw and explain dynamic turn-on and turn-off characteristics of GTO. 10
3. (a) What do you understand by semiconverter? When it is preferred? Derive the load voltage expression & draw circuit diagram. Explain its working with the help of waveforms. 10
(b) Draw and explain Ac full wave control circuit using Diac-Triac with the help of waveforms. Derive the expression for RMS load voltage. 10
4. (a) A single phase fully controlled bridge converter supplies an inductive load. Assuming that the output current is virtually constant and is equal to I_d . Supply voltage is 230 V and if firing angle is maintained at $\frac{\pi}{6}$. 10
 - (i) Average output voltage.
 - (ii) Supply power factor
 - (iii) Supply harmonic factor
 - (iv) Supply fundamental RMS current.
 - (v) voltage ripple factor.
- (b) Explain the construction and working of IGBT with respect to formation of inversion layer and transfer characteristics. 10

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5. (a) Draw the protection circuit for SCR against $\frac{dv}{dt}$, $\frac{di}{dt}$ overvoltage and overcurrent with the help of circuit diagram. 10
- (b) Draw and explain three phase fully controlled bridge converter with R load for continuous and non-continuous conduction mode. 10
6. (a) Draw equivalent circuit UJT. Draw V-I characteristics of UJT and explain UJT relaxation oscillator. 10
- (b) What do you understand by commutation of SCR. Explain class D commutation circuit with the help of waveforms. 10
7. Write short notes on:
- (i) Operating modes of Triac. 7
 - (ii) Cooling techniques of power devices 6
 - (iii) RC triggering circuit 7
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T.E. ETRX Sem VI (Rev) M-2014

Sub- Medical Electronics.

QP Code : MV-18294

Time: 3 Hours

Max. Marks: 100

- N.B.
1. Q. No. 1 is compulsory.
 2. Attempt any four out of remaining six questions.
 3. Assume any suitable data wherever required but justify the same.
-
- 1
 - a List the problem encounter while measuring a living system. Also discuss different sensors used in measurement. 20
 - b Differentiate between invasive and noninvasive techniques. Give any two example of each.
 - c What are prosthetic devices and Therapeutic biomedical instruments also give example of each.
 - d Draw 10-20 electrode placement system in case of EEG measurement.

 - 2
 - a What are the different arrhythmias we can come across in ECG signal? State probable reason for the same show neat waveforms to differentiate them. 10

 - b Design a 2nd order Butterworth Low pass filter is to be designed to filter the EEG signal in the frequency range of 0-200Hz Let the cutoff frequency be 500Hz? 10

 - 3
 - a Differentiate between two electrodes and four electrodes electrical impedance type piezothymo-graph. Also explain the working. 10

 - b Explain generation of EEG signal. With neat sketches show different waves generated. Draw the block diagram and explain each block. 10

 - 4
 - a State the applications of EMG unit. Explain the working with suitable diagram. 10

 - b What is pacemaker? Explain a demand type synchronous pacemaker and rate response pacemaker. 10

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- 5 a Give basic block diagram of CT scanner. Explain four basic subsystems of computer Tomography. 10
- b Explain the working of three op-amps Instrumentation Amplifier. Derive the relationship for gain. Show how you will modify that to PGIA (Programmable Gain IA). 10
- 6 a Give block diagram of automatic indirect system for measurement of blood pressure. Explain the working of each block. 10
- b What is the basic principle of working in case of defibrillators? How does Cardioverter differ from Defibrillator? Draw the block diagram of Cardioverter. 10
- 7 Write a short note on (any Three) 20
- a Physiology of respiratory system.
- b NMR and MRI system of scanning.
- c Bed side Monitor
- d Different sensors used in Biomedical applications
- e Electromagnetic and ultrasonic measurement of Blood flow measurement