

10 (Electronics) Sem-VI

Electronic Instrumentation

1/12/2014

QP Code :15108

(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 classification of transducer. 5
(b) What are the objective of Data Acquisition system? 5
(c) Draw the 3 op-Amp Instrumentation Amplifier & discuss its characteristics. 5
(d) State the seebeck and peltier effect in terms of thermocouple. 5
2. (a) Derive an equation for dynamic response of first order instrumentation system for Ramp input. Draw the response and explain the terms measurement error and lag. 10
(b) What is LVDT? With its characteristics explain its working. State the specifications and limitations. 10
3. (a) Explain strain gauge transducer. Derive the expression of gauge factor for metal strain gauge. 10
(b) Explain window comparator with one industrial example. 10
4. (a) Derive expression for first order Low Pass filter. 10
(b) Explain the construction and operation of Electromagnetic type of flow meter. 10
5. (a) Draw and explain multichannel Data Acquisition system. 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) Explain in detail cascade controller with suitable example. State the advantages. 10
7. Write short notes on any **three** of the following :- 20
 - (a) Five point calibration procedure
 - (b) Virtual Instrumentation
 - (c) Switch capacitor filters
 - (d) Logarithmic Amplifier.

LM-Con.:8945-14.

TE (C) in Telecommunication

Sem VII

Digital Communication

QP Code : 15123

(3 Hours)

[Total Marks : 100

- N.B.:** (1) Question No. 1 is compulsory.
(2) Solve any **four** questions from the remaining **six** questions.
(3) **Figures** to the **right** indicate **full** marks.
(4) Make **suitable** assumptions wherever **required**.

1. (a) Explain Shannon-Hartley Theorem. 5
(b) Explain the necessity of source coding. 5
(c) Explain the necessity of equalization in communication. 5
(d) Differentiate between coherent and non-coherent reception. 5

2. (a) State and prove sampling theorem for low pass signals. Explain with an example, effect of aliasing on the reconstructed signal in time domain. 10
(b) Define entropy and information rate. Generate Shannon-Fano codes for six messages with probabilities 0.2, 0.1, 0.25, 0.15, 0.2, and 0.1 respectively. Calculate the entropy of the source that generates these messages. 10

3. (a) Explain the working of offset QPSK transmitter and receiver with relevant waveforms and signal space representation. 10
(b) Explain the working of Duo binary encoder with precoder. Discuss the merits of modified Duobinary encoder over basic Duo binary encoder. 10

4. (a) Derive the expression for error probability in BPSK system. 10
(b) State the desirable characteristics of line codes in digital communication. Sketch the following line codes for the data stream 1100101 10
 - (i) Polar NRZ
 - (ii) Polar RZ
 - (iii) Unipolar NRZ
 - (iv) RZ - AMI
 - (v) Manchester.

LM-Con.:8957-14.

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QP Code :15123

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5. (a) Derive an expression for the error probability of matched filter. 10
(b) Explain with the help of block diagram the working of M-ary FSK receiver. 10
6. (a) For a (7,4) cyclic code the generator polynomial is given by $g(x) = 1+x^2+x^3$. Sketch the encoder diagram using shift registers, adders and switches. Explain the working of encoder to generate cyclic code for the message (1100). 10
(b) Explain syndrome decoding for cyclic codes with suitable example. 10
7. Write short notes on any two :- 20
- (a) Gram Schmidt procedure
 - (b) Convolutional codes
 - (c) Viterbi algorithm
 - (d) Minimum shift keying modulation system.
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QP Code : 15019

(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. (a) Describe the importance of the 'S' parameters in microwave. 20
(b) Write applications of 'Microwaves'.
(c) Compare 'Travelling Wave Tube' with 'Klystron'.
(d) How are waveguides different from the normal two wire transmission lines ? Discuss the similarities and dissimilarities.

2. (a) Justify : 'TEM mode does not exist in hollow waveguide'. 5
(b) Starting with Maxwell's equations, derive the expression of TE_{mn} wave in rectangular waveguide. 10
(c) What are 'O' and 'M' types of tubes in the microwaves. 5

3. (a) Draw a neat diagram of Two Cavity Klystron Amplifier. Explain with diagram, its bunching process. Derive the equation of its velocity modulation. 10
(b) Explain the working of 'Gyrator' with its neat diagram. 5
(c) An air-filled circular waveguide with radius of 5 cm, operating at TE_{11} mode, 5
(i) Determine the cut-off frequency
(ii) Determine the guide wavelength for the operating frequency of 3GHz.
(iii) Determine the wave impedance in the guide.

4. (a) Draw and explain 'Two-Hole Directional Coupler'. 10
Define : (i) Coupling Factor
(ii) Directivity
(iii) Isolation.
Also, Derive the S-Matrix for the same.
(b) Why 'Hybrid Tee' is called as 'Magic Tee'. Derive S-Matrix for EH plane Tee. 5
(c) Explain, with neat diagram, working of 'Microwave Transistor'. 5

5. (a) Explain the set up for VSWR measurement in microwaves. 10
(b) Justify : 'Waveguide is a High Pass Filter'. 5
(c) A Reflex Klystron Operates under the following conditions : 5
 $V_o = 600 \text{ V}, L = 1 \text{ mm}$
 $R_{sh} = 15 \text{ K}\Omega, f_r = 9 \text{ GHz}$
The tube is oscillating at ' f_r ' at the peak of the $n = 2$ mode. Assume that the transit time through the gap and beam loading can be neglected.
(i) Find the value of repeller voltage.
(ii) Find the direct current necessary to give a microwave gap voltage of 200 Volts.
(iii) What is the electronic efficiency under this condition.

6. (a) Explain with neat diagram, principle of working of 'Rectangular Cavity Resonator'. Also obtain the expression for its resonance frequency. 10
- (b) Explain following terms :— 5
- (i) Cut-off frequency
 - (ii) Dominant Mode
 - (iii) Phase Velocity
 - (iv) Group Velocity
 - (v) Degenerate Mode.
- (c) An IMPATT diode has following parameters carrier drift velocity $v_d = 2 \times 10^7$ cm/s. 5
- Drift region length $L = 6 \mu\text{m}$
- Maximum operating voltage $V_{\text{omax}} = 100$ Volts.
- Maximum operating current $I_{\text{omax}} = 200$ mAmp.
- Efficiency $\eta = 15\%$
- Breakdown voltage $V_{\text{bd}} = 90$ Volts.
- Find : (i) The maximum power in watts.
- (ii) The resonant frequency.
7. Write short notes on any **four** of the following :— 20
- (a) Two Valley Model Theory
 - (b) Strip Lines
 - (c) Applegate Diagram of Reflex Klystron
 - (d) Slow wave structures
 - (e) Limitations of conventional vacuum tubes at microwave frequency.
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(3 Hours)**[Total Marks : 100**

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

- Q1) Answer the following questions: 20 marks
- At reset, interrupts in 8086 processor are disabled. Give reason.
 - List the differences between 8086 and 8088 processor.
 - Explain the pipelining feature of PIC architecture.
 - Explain the significance of HOLD, RESET and READY signals in 8086 processor.
 - Explain status register in PIC controller.
- Q2) a) Explain the data and program memory map in PIC architecture. 10 marks
- b) With the help of a neat flowchart/algorithm write a program in 8086 assembly to obtain the largest and smallest number from a given list of numbers. Assume the relevant details. 10 marks
- Q3) a) Explain 8086-8087 coprocessor configuration in maximum mode of operation. 10 marks
- b) Explain with examples addressing modes in PIC architecture. 10 marks
- Q4) a) Write a detailed note on the interrupt structure of 8086 processor. 10 marks
- b) Using string instructions write a program in 8086 assembly to copy a block ten bytes initialized in data segment to extra segment. Assume the necessary details. 10 marks
- Q5) a) Explain the architecture of 8086 processor. What is the need for memory segmentation. 10 marks
- b) Write a note on the various instruction formats for PIC instructions. 10 marks
- Q6) a) Using table-pointer scheme of program memory addressing for PIC architecture, write a program in PIC assembly to add ten 8-bit numbers. Consider worst case data condition. 10 marks
- b) Explain with one example the addressing modes of 8086 microprocessor. 10 marks
- Q7) Write short notes on
- Operation modes of 8237 DMA Controller
 - I/O modes of 8255 PPI
 - PIC 18 Reset
 - Address modes of 8086 microprocessor
- 20 marks

- N.B. : (1) Question No.1 is compulsory.
 (2) Attempt any **four** questions out of remaining.
 (3) Assume suitable **data** (with appropriate justification only) wherever required.

1. Answer any **four** :- 20

- (i) LTI system is stable if its impulse response is absolutely summable. Justify your answer.
- (ii) List the advantages/disadvantages of DSP processor w.r.t. general microprocessors.
- (iii) Write the analysis and synthesis equation for DTFT, DFT & Z - Transform.
- (iv) How many complex addition and complex multiplication required to be performed to find DFT of 256 point signal using FFT algorithm ? Hence Justify advantage/disadvantage of FET algorithm.
- (v) $x[n] = \{2, -1, \underset{\uparrow}{2}, -3\}$ Express $x[n]$ in terms of its even and odd components.

2. (a) Write one equation for each finite and infinite duration. 10

- (i) Causal signal
- (ii) Anticausal signal
- (iii) Two sided signal

in discrete time domain and plot the same.

(b) $H[n] = \left\{1, -\frac{1}{2}\right\}$, Determine the frequency response. If $H(n)$ is impulse response of an filter then identify the type of filter based on its passed band. 10

3. (a) Explain correlation property of Z- Transform. Determine the cross correlation sequence of z - Transform. Determine the cross correlation sequence $\gamma_{x_1x_2}(l)$ of $x_1[n] = \{1, 2, 3, 4\}$ $x_2[n] = \{4, 3, 2, 1\}$ 10

(b) ALTI system function is given as : 10

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

Determine $h(n)$ if

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

Specify the ROC of $H(z)$ in all cases.

TURN OVER

4. (a) A system has unit sample response $h[n]$ given as 10
- $$h[n] = \frac{-1}{4}\delta[n+1] + \frac{1}{2}\delta[n] - \frac{1}{4}\delta[n-1]$$
- (i) Is the system BIBO stable ?
(ii) Is the system causal ?
(iii) Find magnitude, plot the same (magnitude response only)
- (b) Explain overlap add and overlap save method for filtering of long data sequences. 10
5. (a) Develop DIFFET algorithms for decomposing the DFT for $N = 6$ 10
(b) $x[n] = \{1, 0, 1, 0, 0, 0, 1, 1\}$ find $X(k)$ using DIT - FFT algorithm. 10
6. (a) $x_1[n] = \{1, 2, 3, 4\}$ 10
 $x_2[n] = \{5, 6, 7, 8\}$
 $x_3[n] = \{1 + j, 2 + 6j, 3 + 7j, 4 + 8j\}$
Find DFT of $X_1(k)$, $X_2(k)$ & $X_3(k)$ but computing DFT only once.
- (b) List the two properties of twiddle factor. Justify these properties using appropriate example with $N = 8$ (min data length) 10
7. Attempt any four :- 20
- (1) Compare IIR and FIR system
 - (2) Application of DSP processors
 - (3) Geortzel Algorithm
 - (4) Mapping between s-plane and z-plane for stable systems.
 - (5) System classification.

TE (ETRX) Sem VI (Rev)
Power Electronics

11/12/2014

QP Code :15192

(3 Hours)

[Total Marks : 100

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

(2) Figures to the right indicate full marks

(3) solve any four questions out of remaining six questions.

(3) Solve one complete question together.

1. (a) Differentiate between SCR and IGBT 5
- (b) State and explain the conditions to operate fully controlled bridge converter as an inverter. 5
- (c) Draw and explain equivalent circuit of heat sink. 5
- (d) Explain UJT with the help of equivalent circuit and characteristics. 5
2. (a) What do you understand by commutation of SCR. Explain class C commutation with the help of waveforms. 10
- (b) Design the triggering circuit for SCR using UJT. The UJT parameters are $V_S = 30\text{ V}$, $\eta = 0.51$, $I_p = 1\ \mu\text{A}$, $V_v = 3.5\text{ V}$, $I_v = 10\text{ mA}$. Frequency of oscillation is 50 Hz. Width of the trigger pulse is 50 μs . 10
3. (a) What is the need of freewheeling diode in case rectifier with R-L load. Draw and explain full bridge controlled rectifier with R-L load and freewheeling diode. Derive the relation for average load voltage. 10
- (b) Draw and explain single AC voltage controller circuit using diac and triac. Draw waveforms. 10
4. (a) Explain the role of snubber circuit to protect SCR against high di/dt and dv/dt . 10
- (b) What is the difficulty in parallel connection of SCRS. Draw and explain equalising network with design criterion for components. 10
5. (a) A single phase semiconverter is operated from 120V, 50 Hz ac supply. The load resistance is 10 Ω . The average O/P voltage is 25% of the maximum possible average output voltage. Determine 10
 - (i) Firing angle
 - (ii) RMS and average output current
 - (iii) RMS and average thyristor current.
- (b) Explain three phase bridge full converter ~~with~~ ^{with} R load with continuous load current. 10

- 6 (a) Draw and explain over voltage protection circuit for SCR. 5
- (b) Differentiate between symmetrical IGBT and asymmetrical IGBT 5
- (c) Draw and explain RAMP and pedestal triggering circuit using UJT. Draw waveforms. 10
7. Write short notes on :-
- (a) Performance parameters of controlled rectifier. 5
- (b) Soft start circuit. 5
- (c) Half waving effect in controlled rectifier 5
- (d) GTO switching characteristics. 5
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QP Code :15233

(3 Hours)

[Total Marks : 100

- N.B. :** (1) Question No. 1 is compulsory.
 (2) Attempt any **four** questions out of the remaining six questions.
 (3) Assume any suitable data whenever required but justify the same.

1. Answer any **four** of the following :- 20
 - (a) Prove that the resonant length of dipole is half wavelength.
 - (b) State the reasons for transmission of equalizing pulse during vertical synchronization.
 - (c) In Colour TV transmission colour difference signals are transmitted instead of the three Primary Colour Signal why?
 - (d) Explain the various losses in fiber optical cables.

2. (a) Define the following with suitable diagram a mathematical expression. 10
 - (i) Antenna Beamwidth
 - (ii) Bandwidth
 - (iii) Radiation Pattern
 - (iv) Front to back ratio
 - (v) Antenna efficiency
- (b) Explain the necessity for blanking and synchronizable in T. V. Transmission. 5
- (c) What is Composite video signal. Sketch the composite video signal wave form for three successive Lines. 05

3. (a) Explain in brief MTI Radar System. What do you mean by blind speed in MTI Radar System? 10
- (b) Calculate the two lowest blind speeds of a radar system operating at 3GHz with a pulse repetition frequency of 600 PPS. 05
- (c) What are the advantages of FM-CW Radar over CW - doppler Radar? 05

4. (a) Draw the neat block diagram of PAL-D System & explain the following : 10
 - (i) Colour killer Circuit
 - (ii) Separation of blanking & Synch Pulse.
- (b) Compare the following. 10
 - (i) LCD and PLASMA
 - (ii) Geo and MEO Satellite System.

5. (a) What are the direct broadcast Satellite Service? With the help of block diagram. Explain Digital Satellite Television System. 10
- (b) What are the features of HDTV ? 10
 Draw the block diagram of HDTV Encoder.

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6. (a) Find the Core radius necessary for single, mode operation at 1320 nm of a step-index fiber with $n_1 = 1.480$ and $n_2 = 1.478$ 10
What are the numerical aperture and maximum acceptance angle of this fiber?
- (b) Compare the following 10
- (i) LED and LASER
 - (ii) P - n photodiode and p - i - n photodiode
7. Write short note on the following. 20
- (i) Microwave Antenna
 - (ii) Fiber Configuration and Classification
 - (iii) Multiple access
 - (iv) Satellite Transponder
 - (v) Antenna Scanning and tracking in Radar System
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QP Code :17626

(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 any data wherever required but justify the same.
(4) **Figures to the right** indicate **full Marks**.

1. (A) Compare Paging and Segmentation in brief. 5
(B) Explain different multiprocessor system configuration. 5
(C) Explain restoring division algorithm and draw its flowchart. 5
(D) Explain the register structure of IA32 family. 5
2. (A) Explain the concept of cache memory with reference to the principle of locality of reference, hit ratio and different cache architecture. 10
(B) What is virtual memory? Explain how paging is useful in implementing virtual memory. 10
3. (A) What is bus contention? How it is resolved by using bus arbitration? 10
(B) Draw a block schematic of micro programmed control unit and explain in brief. 10
4. (A) Explain various DMA transfer modes in brief with diagrams. 10
(B) Explain various steps taken by CPU in interrupt processing. Explain how multiple devices share a single interrupt line. 10
5. (A) What are different I/O access methods? Explain in details. 10
(B) Difference between DRAM and SRAM cell. Draw basic diagram for DRAM cell and explain its read and write operation in detail. 10
6. (A) Explain different addressing modes of Pentium processor with suitable example. 10
(B) What is pipelining? Show the suitable example with 5 stage pipelined architecture. 10
7. Write Short notes on: (any **three**) :- 20
 - (A) Booth's Multiplication.
 - (B) Floating point format.
 - (C) Various characteristics of memory.
 - (D) Hazards in pipelined architecture.