3/6/2013

T.E(ETRX) Sem VI (Rev)

1st Half-13-Mina - (d)-40

Power Electronics

Con. 10073-13. **GS-1357**

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

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

1. Attempt following questions :— **20**
   (a) What are the minimum requirements to turn on the SCR ?
   (b) Explain two transistor analogy of SCR.
   (c) What are the characteristics of ideal power semi-conductor devices ?
   (d) Explain four-modes of working of TRIAC.
   (e) Compare the power BJT, MOSFET and IGBT.

2. (a) What is the meaning of commutation of SCR ? Explain any two methods in detail. **10**
   (b) Explain the role of UJT as a relaxation oscillator. Draw the appropriate wave forms. **10**

3. (a) Explain the single phase full wave fully controlled rectifier for inductive load. **10**
   (b) Explain the series connection of SCR. What are the problem associated with this connection ? **10**

4. (a) Explain the three phase controlled rectifier for resistive load. Draw the output waveform for firing angle of 30° and 60°. **10**
   (b) What are the protection circuits for SCR ? Explain each circuit in brief. **10**

5. (a) Explain Diac-Triac circuit for regulating the intensity of Light. (Light-dimmer circuit). **10**
   (b) If the half-wave controlled rectifier has a purely load of R and the delay angle **10**
   is $\alpha = \frac{\pi}{3}$.
   Determine :—
   (i) Rectification efficiency (ii) Form Factor (iii) Ripple Factor.

6. (a) Derive the performance factors namely ; Input Displacement factor, Input Power Factor, DC Voltage, Voltage ratio, Input current distortion factor, Input Harmonic factor and voltage ripple factor for fully-controlled single phase rectifier (Bridge type) with R-L load. **10**
   (b) Explain the construction, working principle, V-I characteristics and applications of DIAC. **10**

7. Write short notes on (any **three**) :— **20**
   (a) Power MOSFET
   (b) IGBT
   (c) GTO SCR
   (d) Cooling methods of SCR.

29/5/13

T.E (ETRX) VI Rev.
Discrete Time Signal & System.

59 : 1ST HALF-13 (s)-JP

Con. 9728–13. **GS–1216**

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

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

1. (a) Classify the following systems on the basis of linearity and time variance / invariance: **5**
   (i) $y[n] = 4\,x[n] - 2y[n-1]$
   (ii) $y[n] - 2ny[n-1] = x[n]$
   (iii) $y[n] + 2y^2[n] = 2x[n] - x[n-1]$
   (iv) $y[n] - 2y[n-1] = 2^{x[n]}\,x[n]$
   (v) $y[n] = x[-n]$

   (b) Find the number of complex addition and complex multiplication required to find DFT for 16 point signal. Compare them with number of computations required, if FFT algorithm is used. **5**

   (c) Prove that Discrete time harmonics are not always periodic in frequency. **5**

   (d) Compare IIR and FIR. **5**

2. (a) Determine causal, non causal and both sided signal associated with z-transform. **10**

$$x(z) = \frac{1}{1 + 1{\cdot}5\,z^{-1} + 0{\cdot}5\,z^{-2}}.$$

   (b) If $x[n] = \{3, 2, 1, 2\}$, $h[n] = \{1, \underset{\uparrow}{2}, 1, 2\}$ **10**

   Determine linear convolution.

3. (a) Consider a sequence $x[n] = \{1, 2, 1, 2, 0, 2, 1, 2\}$. Determine DFT using DITFFT. **10**

   (b) Find DFT of the sequence $x[n] = \{1, 2, 3, 4\}$ and using this result and not otherwise. **10**
   Find DFT of –
   (i) $x_1[n] = \{1, 0, 2, 0, 3, 0, 4, 0\}$
   (ii) $x_2[n] = \{1, 2, 3, 4, 0, 0, 0, 0\}$
   (iii) $x_3[n] = \{1, 2, 3. 4, 1, 2, 3, 4\}$

[TURN OVER

4. (a) The transfer function of discrete time system has poles at $z = \frac{1}{3}$, $z = \pm \frac{j}{2}$, and $z = -2 \pm j$ and zeros at $z = 0$ and $z = -1$. **10**

   (i) Sketch pole-zero diagram

   (ii) Derive the system transfer function

   (iii) Develop difference equation

   (iv) Find if the system is stable.

   (b) Derive the composite radix for $\delta = 2 \cdot 3$ algorithm. Draw the flow chart. **10**

5. (a) Explain Overlap add and overlap save method. **10**

   (b) Determine the steady state response of the system $H(z) = \frac{3z^2}{z^2 - z + 1}$ for the input $x[n] = (0 \cdot 6)^n + 2(0 \cdot 4)^n \cos(0 \cdot 5\, n\, \pi - 100°)$. **10**

6. (a) Show DF-I, DF-II , cascade and parallel realization for $H(z) = \frac{1 - \frac{1}{2} z^{-1}}{1 - z^{-1} + \frac{3}{16} z^{-2}}$. **10**

   (b) Let $H(z) = \frac{z^2}{z^2 - \frac{1}{6} z - \frac{1}{6}}$ let the input $x[n] = 4\, u(n)$ and the initial conditions be **10**

   $y[-1] = 0$, $y[-2] = 12$.

   Find :—

   (i) Zero input response

   (ii) Zero state response

   (iii) Total response.

7. Write short notes (any **four**) :— **20**

   (a) Properties of DTFT

   (b) Geortzel Algorithm

   (c) Mapping between s-plane and z-plane

   (d) Applications of DSP to Biomedical field

   (e) TMS 320C5X series processor.

TE CETRX) sem VI 11/5/2013

Microwave Devices & circuits.

82 : 1st half.13-shilpa(h)

Con. 7246-13. **GS-9759**

(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) **Figures** to the **right** indicate **full** marks.
(4) Assume suitable **data** wherever **necessary**.

1. (a) What are applications of Microwaves ? **5**
   (b) Can TEM mode exist in hollow waveguide ? Justify your answer. **5**
   (c) What are O-type and M-type devices in microwave ? **5**
   (d) Explain the terms : Cutoff frequency, Dominant mode, Phase velocity, Group velocity. **5**

2. (a) Derive wave equation for TE wave and obtain all the field components in a rectangular waveguide. **10**
   (b) Explain the action of isolator and circulator using ferrites, mention their typical applications. **10**

3. (a) Draw a neat diagram of two cavity Klystron amplifier and explain the bunching process. Derive the equation of velocity modulation. **10**
   (b) An X-band pulsed cylindrical magnetron has the following parameters : **10**
   Anode voltage : $V_o = 2{\cdot}6 \times 10^4$ V
   Beam current : $I_o = 27A$
   Flux density : $B_o = 0.336$ Wb/m^2
   Radius of cathode cylinder : a = 5 cm
   Radius of Vane edge to centre : b = 10 cm.
   Compute : the cyclotron angular frequency, the cutoff voltage for a fixed B, and the cutoff magnetic flux density for a fixed V_o.

4. (a) Draw and explain two-hole directional coupler. Define coupling factor, directivity and isolation. Derive S matrix for the same. **10**
   (b) Explain Gunn effect with the two-valley model of Gunn diode. What are the criteria that the semiconductor must satisfy in order to exhibit negative resistance ? **10**

5. (a) What are slow wave structures ? Explain how helical TWT does amplification. **10**
   (b) Describe the types of strip line in brief. **5**
   (c) Explain excitation of modes in circular waveguides. **5**

6. (a) Explain the methods used for power measurement in microwaves. **10**
   (b) With the help of sketch distinguish between IMPATT and TRAPATT diode. **10**

7. Write short notes on any **three** of the following :– **20**
   (a) Limitations of conventional tubes at microwave frequencies
   (b) Waveguide attenuators
   (c) Measurement of VSWR
   (d) Microwave transistor.

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T.E (ETRX) VI 18/5/13

μP & μC II

ws-Con-2013-46

Con. 9055–13. **GS–9918**

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

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

1a) Explain instruction format of 8086 microprocessor.

b) Write function of the following 8086 microprocessor pins

i) LOCK (bar) ii) QS0 &QS1 (bar)

c) Draw timing diagram for minimum mode 8086 read bus cycle.

d) Explain the application of timer in PIC18F microcontroller. 20 marks

Q. 2 a) Explain in detail software and hardware architecture of 8086 10 marks

b) Write a program in ALP of 8086 to compute the factorial of a number. 10 marks

Q. 3 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. 4 a)Draw and explain functional block diagram of 8257. Explain the bit configuration of mode set register and status register of 8257. 10 marks

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

[TURN OVER

Q. 5 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)How the DMA operation is taken place with 8257. Explain the operation with the help of timing diagram and state diagrams. 10 marks

Q. 6 a)Explain the interfacing diagram of 8259in maximum mode and cascaded mode. 10 marks

b)Write a program for PIC 18F to find the largest number stored in the array that is stored in data memory locations from ox10 to ox5F 10 marks

Q. 7 Write short notes;

a) Assembler directives for 8086 7marks

b)Handshaking mode of 8255PPI 7 marks

c)Configuration of 8259 OCWS 6 marks

 TE-SEM VI (REV.)-ETRX 23/5/13 May 2013

E.I.S.

Con. 9184–13. **GS–1069**

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

N.B. (1) Question No. **1** is **compulsory**.
(2) Answer any **four** from the remaining **six** questions.
(3) Draw **suitable** diagram.

1. (a) What are the static and dynamic characteristics of measurements ? Define each of them. **10**
   (b) Explain the working and application of LVDT. **10**

2. (a) What is the difference between active and passive filters ? Explain frequency response of Low pass, High pass, Bandpass and Band Reject filter. Show how Bandpass response can be achieved from Low pass and High pass filter. **12**
   (b) Explain the principle and working of a switched capacitor filter. **8**

3. (a) Explain the principle of RTD. Draw the 3-wire scheme for temperature measurement using RTD. **10**
   (b) What is Data Acquisition System ? Draw block diagram for a Multichannel Data acquisition system and explain. **10**

4. (a) What are various pressure sensing elements ? Draw and explain all of them. **10**
   (b) What are the various signal conditioning circuits ? Explain any two of them. **10**

5. (a) Compare RTD, thermocouple and thermistor. **10**
   (b) What is an Instrumentation amplifier ? Explain three Op-amp instrumentation amplifier and derive necessary equations. **10**

6. (a) What is a Data Logger ? Draw its block diagram and explain. **10**
   (b) Explain successive approximation A/D converter with block diagram. **10**

7. Write short notes on any **three** :– **20**
   (a) Humidity measurement
   (b) Five point calibration procedure
   (c) PID controller using Op-amp
   (d) Explain ON-OFF control process.

ETRX 7/6/13

T.E Sem VI Rev. Course M/J-2013

Elective I : CO

ws Feb. 2013-(f) 30

Con. 10047–13. **GS–1513**

(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) **Figures** to the **right** indicate **full** marks.

1. (a) Explain restoring division algorithm using an example and draw its flowchart. **5**
   (b) Write microinstructions for the instruction Add R_o, $[R_3]$. **5**
   (c) Draw register structure of IA-32 family. **5**
   (d) Explain in brief using memory segmentation how 64 Terabytes of virtual memory address can be accessed. **5**

2. (a) Multiply following using Booth's algorithm : **10**
      (i) (–4) * (–9)
      (ii) (–7) * (3).
   (b) Compare horizontal microprogramming with vertical microprogramming. **10**

3. (a) Explain various characteristics of memory. **10**
   (b) What is the necessity of replacement algorithm ? Show how pages are replaced between cache and main memory using replacement policies : **10**
      (i) LRU (ii) FIFO (iii) LFU.

4. (a) Explain register structure in ARM family architecture. **10**
   (b) Write various DMA transfer modes in brief with suitable example. **10**

5. (a) What is bus contention ? How is it resolved by using bus arbitration ? Explain various bus arbitration methods. **10**
   (b) Design a 4 bit fast adder (carry look ahead adder). **10**

6. (a) Explain concept of cache memory with reference to principle of locality, Hit ratio and draw and explain different cache architectures. **10**
   (b) What happens when the following ARM instructions are executed ? **10**
      (i) MUL R_1, R_2, R_3
      (ii) BL target
      (iii) ADDS R_2, R_3, R_4
      (iv) RSBLES R_1, R_2, # 5.

7. (a) What are different addressing modes of IA-32 family ? Explain with example. **10**
   (b) What is virtual memory ? How paging is useful in implementing virtual memory ? **10**
