1-1st Half-12 mina (Con.4720)

Con. 4720-12.   GN-9215

(3 Hours)   [Total Marks : 100

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

1. Attempt the following :—   20
    (a) Explain briefly, the 'SOA' rating of the Power Transistors.
    (b) Explain the importance of $\frac{dv}{dt}$ and $\frac{di}{dt}$ rating along with proper protection
         circuit in case of SCR.
    (c) State the conditions for getting inversion mode operation in case of line
         commutated converters.
    (d) Explain the need of commutation in thyristor circuits. What is voltage
         commutation and current commutation ?

2. (a) Explain with neat circuit diagram and associated waveforms the operation of 10
         single phase semiconverter with RL load. Derive the expression for average
         load voltage, average load current and RMS load voltage.
    (b) Explain with neat diagram the full wave A.C. phase control using Triac and Diac. 10
         Draw waveforms.

3. (a) A 3 phase half wave controlled rectifier is operated on a 3 phase A.C. supply with 10
         an RMS phase voltage of 230 volts and f = 50 Hz. The load resistance R = 10 Ω.
         For an average output voltage of 40% of the maximum possible output voltage,
         Calculate :—
             (i)   Delay angle α
             (ii)   RMS and average load currents
             (iii) RMS and average thyristor currents.
    (b) Explain UJT triggering circuit for triggering of 2 SCR's used in full wave controlled 10
         rectifier with proper isolation. What is the need of synchronization circuit ?

4. (a) Explain with neat circuit diagram the operation of static D.C. circuit breaker.   10
    (b) For a single phase fully controlled bridge rectifier, derive the expression for the 10
         following performance factors :—
             (i)   D.C. Voltage ratio
             (ii)   Current distortion factor
             (iii) Harmonic factor
             (iv)   Input displacement factor
             (v)   Voltage ripple factor.

[TURN OVER

5. (a) Explain the operation of 3 phase fully controlled rectifier with resistive load. Draw **10**
         the various waveforms for $\alpha = 30°$.

    (b) Explain latchup in IGBT. How does latchup take place and how to avoid it ?   **10**

6. (a) Explain with neat diagram and associated waveforms the operation of auxiliary **10**
         voltage commutation.

    (b) What is half waving effect in case of single phase half wave controlled rectifier   **5**
         with RL load ?

    (c) A half wave controlled rectifier is connected to a 120 V source. Calculate the   **5**
         firing angle necessary to deliver 150 W of power to a 10 Ω load.

7. Write short notes on :—   **20**

    (a) Soft start method

    (b) Dynamic (Turn ON and Turn OFF) Characteristics of SCR

    (c) Types of cooling of a power semiconductor device.

AGJ 1st half (h)-Con-Cod 80

Con. 3738-12.

TE / ETRX / VI (REV) 17/5/12
MDC

GN–7196

(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 wherever **required**. Justify the **same**.

Q1. (a) What are O-type and M-type devices in microwave?   20
(b) Compare IMPATT and TRAPATT diodes.
(c) What are slow wave structures? For what purpose are the slow-wave structures used in microwave devices?
(d) What do you understand by the following terms:-
1. Cut off frequency   2. Degenerate mode 3.phase velocity   4. Group velocity
5.Dominant mode.

Q2. (a) Derive the field equations for TE modes in rectangular waveguide.   10
(b) Prove that TE10 is the dominant mode of propagation in a rectangular   5
waveguide.
(c) A TE11 mode is propagating through a circular waveguide. The radius of the   5
guide is 5 cm, and the guide contains an air dielectric.
   a. Determine the cutoff frequency.
   b. Determine the wavelength λg in the guide for an operating frequency of
3GHz.
   c. Determine the wave impedance Zg in the guide.

Q3. (a) Draw a neat diagram of Klystron amplifier and explain the bunching process   10
with Applegate diagram. Derive the equation of velocity modulation.
(b) A Reflex Klystron operates under the following conditions: 6
   V0 = 600V   L=1mm
   Rsh = 15KΩ fr = 9GHz
The tube is oscillating at Fr at the peak of the n= 2 mode. Assume that the transit time through the gap and beam loading can be neglected.
   a. Find the value of the repeller voltage Vr
   b. Find the direct current necessary to give a microwave gap voltage of 200V
   c. What is the electronic efficiency under this condition?

(c) Explain excitation of modes in rectangular waveguides.

Q4. (a) What are cross field devices? Explain the working of cylindrical magnetron   10
oscillator and π mode of operation.
(b) An X-band pulsed cylindrical magnetron has the following parameters:
   Anode voltage: V0 = 26kV
   Beam current : I0 = 27A
   Magnetic flux density: B0 = 0.336Wb/m2
   Radius of cathode cylinder: a =5 cm
   Radius of vane edge to centre: b = 10cm   10
  Compute:
   a.   The cyclotron angular frequency
   b. The cutoff voltage for a fixed B
   c. The cutoff magnetic flux density for a fixed V0.

[TURN OVER

Q5. (a) Explain Gunn effect with the Two-valley model of Gunn diode. What are the   10
criteria that the semiconductor must satisfy in order to exhibit negative
resistance?

(b) Explain the working of microwave circulators.   5

(c) Why is Hybrid Tee called as the magic Tee? Derive the S-matrix of the E-H   5
plane Tee.

Q6. (a) Draw and explain Two-Hole directional coupler. Define coupling factor,   10
Directivity and Isolation Derive the S matrix for the same.

(b) For a rectangular waveguide, which propagates in the dominant mode at a   10
frequency of 5 GHz, find 'a' and 'b'? The cutoff frequency of which is 0.8 of the
signal frequency and the ratio of the guide height to width is 2. Also determine:-
1. Phase velocity
2. Group velocity
3. Guide wavelength

Q7.   Write short note on any **four**:-   20

(a) Measurement of VSWR in microwave.
(b) Travelling Wave Tube.
(c) Microwave transistors.
(d) Cavity resonators.
(e) Limitations of conventional tubes at microwave frequencies.

PH March Exam (4) 13

Con. 3779-12.

22/5/12

T· E (ETRX) Sem VI (R)

GN-7182

Microprocessor &

(3 Hours)   Micro controller - II   [Total Marks : 100

N.B. (1) Question No. **1** is **compulsory** and solve any **four** from remaining **six** questions.
      (2) **Figures** to the **right** indicate **full** marks.
      (3) Assume data if **necessary,** and give **justifications**

1. (a) Explain rotate instructions of PIC 18 F controller.   5
   (b) Explain flag register of 8086 processor.   5
   (c) Explain MOVLW and COMF instructions in PIC 18 F.   5
   (d) Explain need for handshaking signal used with various modes of 8255 PPI.   5

2. (a) Explain working and interface of numeric data coprocessor 8087 with 8086.   10
   (b) What are the different function blocks in 8259, Programmable Interrupt Controller ?   10
       Explain their role in the process of interrupt handling.

3. (a) Discuss in brief, the memory organization of PIC 18 F microcontroller. What is the   10
       purpose of processor stack ?
   (b) Give **two** examples of each type of addressing modes in 8086 given below :   10
       (i)   Direct Addressing
       (ii) Based Addressing
       (iii) Implicit Addressing
       (iv) Immediate Addressing
       (v)   Based and Indexed Addressing.

4. (a) Draw and explain 8086 system operating in maximum mode.   10
   (b) Write a program to perform 32 bit × 32 bit multiplication.   10

5. (a) Explain different addressing modes of PIC 18 F.   10
   (b) Draw timing diagrams for minimum mode of 8086–   10
       (i)   Read Bus Cycle
       (ii) Write Bus Cycle.

6. (a) Explain any **two** applications of Timer in PIC 18 F and write a program to calculate 10
       delay of 100μs (Frequency is 40 MHz).
   (b) Design 8086 based micro computer system using minimum mode with following   10
       specifications :
       (i)   CPU working at 5 MHz
       (ii) 32 kB SRAM (16 kB × 8 devices)
       (iii) 32 kB EPROM (8 kB × 8 devices)
       Draw neat schematic and use exhaustive decoding.

7. Write short notes on :–
   (a) PIC 18 Reset   5
   (b) Comparative study of salient features of 8086 and Pentium   5
   (c) DMA Controller modes   5
   (d) Mixed Language programming.   5

28 : 1st half.12-AM(y)

Con. 4209-12.

GN-7193

(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 suitable **data** whenever **required**.
　　　　(4) Illustrate answer with **sketches** whenever **required**.
　　　　(5) **Figures** to **right** indicate **full** marks.

1.　Attempt any **five** of the following :—　　　　　　　　　　　　　　　　20
　　　(a) Define the terms process equation, process lag with suitable example.
　　　(b) Explain the logarithmic compression used for signal conditioning in Instrumentation System.
　　　(c) State the advantages of Electrical Transducer.
　　　(d) Compare and contrast Reproducibility and Repeatability of an Instrument.
　　　(e) What is calibration of an Instrument ? State its need.
　　　(f) What are the objectives of Data Acquisition System ?

2.　(a) Derive an equation for dynamic response of first order instrumentation system for　10
　　　　Ramp input. Draw the response and explain the terms measurement error and lag.
　　　(b) Explain the construction, working principle and operation of Electromagnetic type of　10
　　　　flow meter.

3.　(a) Explain with neat block diagram multichannel data acquisition system to monitor　10
　　　　temperature, flow, pressure, displacement, level and force.
　　　(b) Explain Distributed Control System (DCS) with neat diagram.　　　　　　　　10

4.　(a) Explain thermocouple for temperature measuring in view of (i) Material Used and　10
　　　　Range (ii) Reference Junction Compensation (iii) Advantages and Disadvantages
　　　　over other types of temperature transducers.
　　　(b) What are the advantages of Instrumentation amplifier ? Design three op-amp　10
　　　　programmable gain Instrumentation amplifier for the gain of 10,100.

5.　(a) What is LVDT ? Explain and draw the complete constructional diagram for it. State　10
　　　　features and limitations of this transducer. Also explain the use of Phase Sensitive
　　　　Detector (PSD) for operation of LVDT.
　　　(b) Explain in detail cascade controller with suitable example. State the advantages.　10

6. (a) For the error shown in **figure (a)** below, draw approximate PD Controller output as **10** a function of time. (Range of controller o/p is 0–100%, at zero error controller output = 50%).

Fig (a)
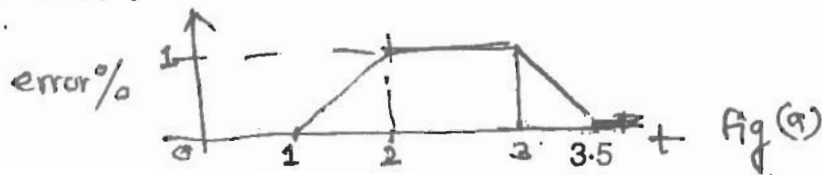
Also draw neat circuit diagram of PD Controller and derive the expression for controller output.

(b) Design a second order active low pass filter for a cutoff frequency of 1 kHz. **10**

7. Write short notes on any **two** of the following :— **20**
    (a) Data logger
    (b) pH measurement
    (c) Control Valves : Classification and Characteristics
    (d) Five point calibration procedure.

Con. 4536-12.

GN-8624

(3 Hours)

[Total Marks : 100

N.B. (1) Questions No. **1** is **compulsory**.

(2) Attempt any **four** questions from the remaining **six** questions.

1. a) Find the Z-transform and hence DFT of:- $x(n) = \left(\frac{1}{4}\right)^n u(n+4)$ 5

   b) Find the magnitude and phase response of the system described by the difference equation:-   5

   $$y(n) = x(n) + \frac{1}{3}x(n-1) + \frac{1}{6}x(n-2)$$

   c) Derive Parseval's Energy Theorem. Also state the significance of the same.   5

   d) Calculate the speed improvement factor in calculating 256 point DFT of a sequence using direct   5
   computation and using FFT algorithm.

2. a) Find Energy/Power of the following signals:-   8

   i) $x(n) = \left(\frac{1}{3}\right)^n$ for n≥0   ii) $x(n) = 3\cos(4\pi n + \theta)$.

         $= 3^n$ for n<0

   b) Test the following systems for linearity and time invariance:-   6

        i) $y(n) = a^{x(n)}$ ii) $y(n) = 2x(n) + \dfrac{1}{x(n-1)}$

   c) Determine the transfer function, impulse response and step response for the system given by:-   6
   $y(n) = y(n-1) + x(n) + x(n-1)$

3. a) Determine the inverse ZT for $X(Z) = \dfrac{z}{3z^2 - 4z + 1}$ ROC |Z|>1   8

   b) Obtain Cascade and Parallel realization of the second order DT linear system defined by:-   12

   $$y(n) - \frac{3}{4}y(n-1) + \frac{1}{8}y(n-2) = x(n) + \frac{1}{3}x(n-1)$$

4. a) Determine the circular convolution of the two sequences $x_1(n)$ and $x_2(n)$ if-   10

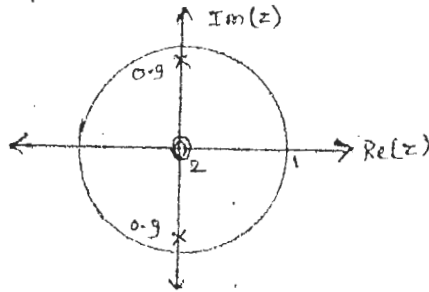 $x_1(n) = \delta(n) + \delta(n-1) - \delta(n-2) - \delta(n-3)$ and

   $x_2(n) = \delta(n) - \delta(n-2) + \delta(n-4)$

[TURN OVER

b) For the pole-zero plot of a system shown below:- 10

i) Find the equation of magnitude response

ii) Plot the magnitude response

iii) Identify the type of system based on pass band.

5. a) Given $x(n) = 2^n$ and N=8, find X(K) using DIT-FFT algorithm. 10

b) For x(n)={ 1+5j, 2+6j, 3+7j, 4+8j }, find DFT X(K). 10

Using the result above and not otherwise, find DFT of following sequences:-

i) x1(n) = { 1, 2, 3, 4 }   and ii) x2(n) = { 5, 6, 7, 8 }.

6. a) Explain the overlap-add and overlap-save method for filtering of long data sequences. 10

b) Draw the functional block diagram of TMS320C5X processor and explain various functional units. 10
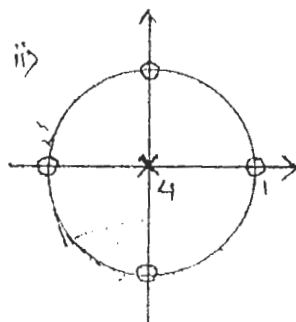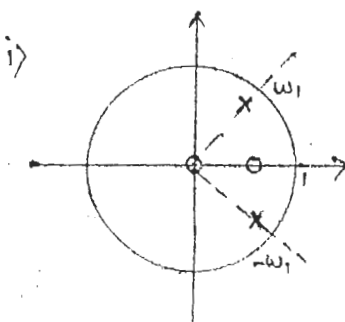
7. a) Using DFT/IDFT, find circular convolution of- x1(n) = { 1, 1, 2, 2 }   and   x2(n) = { 1, 2, 3, 4 }. 10

b) Classify the following systems as FIR/IIR, Min/Max/Mixed Phase and specify the pass band from 10

the pole-zero plot shown:-
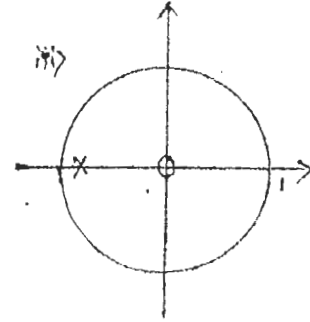
(3 Hours)   [Total Marks : 100

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

1. Answer any **four** questions :–   20
    (a) Define directivity and antenna gain. Why nonresonant antenna are generally unidirectional ?
    (b) What is geostationary orbit ? Prove that as per Kepler's law satellite orbit is an ellips.
    (c) Justify, Interlaced scanning help to reduce flicker and bandwidth of the video signal.
    (d) What are the factors influencing the bandwidth of a radar receiver ? Why radar pulse should have vertical edges and flat tops ?
    (e) What are the major elements of an optical fiber transmission link ? Draw the neat block diagram of an optical link.

2. (a) A half wave dipole in operating at 90 MHz with efficiency of 98% the directivity   10
    of antenna in $2 \cdot 15$ dB and its loss resistance is 2Ω find –
       (i) Radiation Resistance
       (ii) Length of antenna
       (iii) Antenna power gain.
   (b) What is the effect of ground on antenna ? Explain in brief the mechanism used   5
    to increase the conductivity of the system.
   (c) Explain in brief Antenna Coupling Networks.   5

3. (a) Justify, the highest modulating frequency used in 625 line TV system is 5 MHz   5
    and the channel bandwidth is about 7 MHz.
   (b) Explain the necessity of blanking, synchronizing and colour burnt signal in T.V.   5
    Transmission System.
   (c) Define composite video signal sketch the composite video signal waveform   10
    for three successive lines and indicate.
       (i) Extreme white level
       (ii) Pedestal height and DC level
       (iii) Blanking level
       (iv) Synchronous pulse level
       (v) Front and Back Porch.

[TURN OVER

4. (a) With the help of suitable diagram justify that PAL-D system is capable of cancelling phase error.　　　5

   (b) What are the features of HDTV draw the neat block diagram of HDTV encoder ?　　　5

   (c) Draw the functional block diagram of PAL-D colour TV receiver. Explain the difference between chrominance and luminance signal. How is colour picture tube able to display white ?　　　10

5. (a) Explain in brief MTI radar system. What do you mean by blind speed in MTI radar system ?　　　5+5
   Calculate the two lowest blind speeds of a radar system, operating at 3 GHz with a pulse repetation freq. of 600 PPS.

   (b) With the help of neat block diagram explain FM-CW radar. What are its advantages over CW-doppler radar ?　　　6+4

6. (a) What are the direct broadcast satellite services ? With the help of neat block diagram explain Digitial Satellite Television System.　　　10

   (b) Explain –
   　　　　　(i) Look Angles　　　5
   　　　　　(ii) Satellite Transponders.

   (c) Write short note on multiple access scheme in satellite communication.　　　5

7. (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.　　　5
   What are the numerical aperture and maximum acceptance angle of this fiber ?

   (b) Compare the following (any **two**) :–　　　10
   　　　　　(i) LED and LASER
   　　　　　(ii) P-n photodiode and P-i-n photo diode
   　　　　　(iii) LCD and PLASMA.

   (c) Write short notes on the following (any **one**) :–　　　5
   　　　　　(i) Cable T.V.
   　　　　　(ii) Fiber clssification.

97 1st half-12-(j)JP

Con. 4843-12.

GN–9707

(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) Solve using Booth's algorithm. 5
  Multiplicand (M) = −7 (1001),
  Multiplier (Q) = 3 (0011)
     A = 0000.
 (b) Write microinstructions for instruction Add R_0, [R_3]. 5
 (c) Draw the register structure of IA 32 family. 5
 (d) What happens when the following ARM instructions are executed ? 5
    (i) MLA R4, R3, R7, R8
    (ii) BL func.

2. (a) Explain the concept of Cache memory with reference to the principle of locality 10
  of reference, hit ratio and different Cache architectures.
 (b) Explain how a virtual address is converted into physical address using paging. 10
  Also explain TLB.

3. (a) What is bus arbitration ? Explain different techniques for bus arbitration. 10
 (b) Explain input and output operation in asynchronous bus with the help of timing 10
  diagrams.

4. (a) What is microprogramming ? Draw and explain microprogrammed control unit. 10
 (b) Consider a Cache consisting of 128 blocks of 16 words each, for a total of 2048 10
  (2k) words and assume that the main memory is addressable by a 16 bit address
  and it consists of 48 blocks.
  How many bits are there in each of the TAG, SET and WORD fields for different
  mapping techniques i.e.
    (i) Direct
    (ii) Associative
    (iii) 2-way set associative.

5. (a) Draw flowchart for restoring division method and explain using diagram steps 10
  for performing restoring division using numbers Dividend = 8 and Divisor = 3.
 (b) What is pipelining ? Explain data hazard and code hazard in pipelining. 10

6. (a) What are various steps taken by the CPU in interrupt processing ? Explain how 10
  multiple devices share a single interrupt line.
 (b) Explain different addressing modes of an IA-32 processor with example. 10

7. (a) Explain register structure in ARM family architecture. 10
 (b) What is the necessity of replacement algorithm ? Show how pages are replaced 10
  between Cache memory and main memory using replacement policies :—
    (i) LRU   (ii) FIFO   (ii) LFU.