19/12/11 ME ETRX - Sem - II (Rev) ACT

2 2nd half.11-AM(g)

Con. 6971-11. **BB-2668**

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

N.B. : (1) Question No. **1** is **compulsory**.
(2) Answer any **four** out of **remaining** questions.

1. Answer the questions briefly (any **four**) :— **20**
   (a) State and prove Nyquist criterion for a band-limited channel with zero ISI.
   (b) What is the condition to be satisfied for a valid generator polynomial ? Construct the generator matrix, G, for a systematic (7,4) cyclic code using generator polynomial, $g(x) = x^3 + x + 1$.
   (c) Distinguish between Rayleigh fading and Ricean fading channel, giving their pdfs.
   (d) Explain 'Hamming bound'. Hence, obtain the relation between 'n' and 'm' for Hamming code.
   (e) Explain the significance of 'equalizer' in digital communication systems. And why there is a need for adaptive equalization ?

2. (a) For a (9, 5) linear block code with **8**

$$p_1 = m_1 + m_3 + m_4 + m_5$$
$$p_2 = m_1 + m_2 + m_4 + m_5$$
$$p_3 = m_1 + m_2 + m_3 + m_4$$
$$p_4 = m_1 + m_2 + m_3 + m_5$$

   (i) Show the generator matrix and Parity-check matrix, for the code.
   (ii) Find the code words for msg : 11011, 10001, 11001
   (iii) Find the minimum distance of the code, error-correcting and error-detecting capability.

   (b) Design a "feedback-shift register encoder" for an (8, 5) cyclic code with generator polynomial $g(x) = 1 + X + X^2 + X^3$ **12**
   (i) using the encoder, find the codeword for the msg : 11011, in systematic form.
   (ii) consider the codeword generated in part(i) as i/p to the decoder and find the syndrome using 'Syndrome-calculator'.

3. (a) A convolutional code is described by $g_1 = \{110\}$, $g_2 = \{111\}$ and $g_3 = \{101\}$. **10**
   Sketch the encoder and find the codeword for the msg sequence, 11100111.

   (b) For the encoder given in Q. 3(a), if the received sequence is **10**
   r = [110 110 110 111 010 101], use Viterbi algorithm to find the transmitted bit sequence.

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4. (a) With a neat sketch, explain the working of a preset equalizer. What are its limitations ?

(b) The unequalized pulse in a PAM System has the following values at Sampling times —

$$p_r(k) = \begin{cases} 0 & k = -2 \\ 0{\cdot}1 & k = -1 \\ 1{\cdot}0 & k = 0 \\ -0{\cdot}2 & k = +1 \\ 0{\cdot}1 & k = +2 \\ 0 & \text{otherwise} \end{cases}$$

(i) Design a three-tap zero forcing equalizer.

(ii) Find the equalizer output for $k = \pm 2, \pm 3$ and sketch the equalized pulse.

(iii) Determine the residual ISI and its span in time.

5. (a) With a neat sketch, explain the working of decision feedback equalizer. Obtain the equation for coefficients of feed-forward and feedback filter.

(b) Explain LMS algorithm. Explain the effect of step-size on the convergence rate and excess mean square error.

6. (a) Explain how the time-synchronization of receiver spread spectrum signal may be achieved. **8**

(b) Explain various diversity techniques used to improve the performance of a digital communication system. **6**

(c) Compare the performance of hard-decision and soft-decision decoding. **6**

7. Write short notes on any **four** of the following :—

(a) FFT-based multi-carrier system

(b) Trellis Coded Modulation

(c) FH-SS system with slow and fast frequency hopping

(d) Characteristics of band-limited channel

(e) Viterbi algorithm for decoding convolutional code

(f) Diversity combining methods.

29/11/11 ME Sem II (ETRX)
Microprocessor & system II

Con. 5963-11.

BB–2656

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

N.B. : (1) Question Number **1** is **compulsory**. Solve any **4** from remaining **6** questions.
(2) Draw **neat** diagrams wherever **necessary**.

Q.1 A.	Explain why code cache of Pentium processor is triple ported.	**05**
B.	Explain the use of BTB in prediction of branches.	**05**
C.	Explain different types of data transfers in USB	**05**
D.	Explain Latency Timer and its use in PCI bus.	**05**
Q.2 A.	Explain floating-point instruction execution stages in Pentium processor.	**10**
B.	Explain Write policy implemented in L1 data cache of Pentium Processor with the help of MESI protocol.	**10**
Q.3 A.	Write about special cycles of Pentium Processor.	**10**
B.	Explain Following signals in Pentium Processor **R/S#, LOCK#, CACHE#, SMI#, A20M#**	**10**
Q.4 A.	Explain the basic features of real time operating system, taking example of QNX.	**10**
B.	Explain how are interrupts routed in PCI bus? Give suitable example. Also explain use of Interrupt Pin register and Interrupt Line register.	**10**
Q.5 A.	Explain the process of device enumeration of any USB device of your choice.	**10**
B.	Explain importance of interrupt handler in QNX operating system.	**10**
Q.6 A.	Master A wants to perform 2 transactions as 3 data writes from device C, 2 data reads from device D Master B wants to perform 2 data reads from device D Master A requests first, and starts the transaction, Master B requests while first transaction of Master A is going on and rotating priority is implemented. Explain transactions performed with timing diagrams.	**12**
B.	Explain bus parking in PCI bus.	**08**
Q.7 A.	With suitable diagram explain organization of data cache of Pentium processor; hence explain what bank conflict is.	**10**
B.	Explain with suitable example state transitions of Pentium bus cycles.	**10**

9/12/2011 ME ETRX Sem-II (R-)
Power Electronics

Con. 6061-11. **BB-2662**

(4 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 wherever **required** but justify the same.

1. Solve the following :— **20**
   (a) What are the power Diodes ? Explain the working in brief.
   (b) What are the main differences between voltage source inverter and current source inverter ?
   (c) Describe the basic principle of working of a single phase to single phase cycloconverter for a continuous conduction.
   (d) Explain the working of permanent magnet stepper motor.

2. (a) A separately excited DC motor is fed from a 230 V, 50 Hz supply via a single phase half controlled bridge rectifier. Armature parameters are : Inductance = 0·06H, resistance = 0·3 Ω, the motor voltage constant is Ka = 0·9 V/A rad/sec. and the field resistance is R_F = 104 Ω. The field current is also controlled by a semiconverter and is set to the maximum possible value. The load Torque is T_L = 50 N-m. at 800 rpm., the inductance of the armature and field circuits are sufficient enough to make the armature and field currents continuous and ripple free, compute — **10**
      (i) The field current I_f
      (ii) The firing angle of the converter in the armature circuit
      (iii) The input power factor of the armature circuit converter. Neglect the system losses.
   (b) Draw and explain the operation of speed control of d.c. series motor by a single phase semi-converter for the continuous motor current, waveforms. **10**

3. (a) Explain the principle of vector or field oriented control for induction motors. **10**
   (b) A 3-phase 11·2 kW, 1750 rpm, 460 V, 60 Hz, four-pole, Y connected induction motor has the following parameters R_s = 0·66 Ω, R'_r = 0·38 Ω, X_s = 1·14 Ω, X'_r = 1·71Ω and X_m = 33·2 Ω. The motor is controlled by varying both the voltage and frequency. The volts/hertz ratio, which corresponds to the rated voltage and rated frequency is maintained constant. **10**
      (i) Calculate the maximum torque T_m and the corresponding speed W_m for 60 and 30 Hz;
      (ii) Repeat (i) if R_s is negligible.

4. (a) A d.c. series motor used for a rapid transit system is fed through a dc chopper. The dc motor has the total circuit resistance of 3 Ω and inductance of 0·15 mH. What external inductance should be inserted in series with the armature circuit in order to limit the per unit ripple in armature current to 10% for a duty-cycle ratio 0·4 ? The chopping period is 1000 μs. **10**
   (b) Explain briefly the operation of round rotor synchronous motor. Also derive the expression for field excitation. **10**

5. Discuss why a 3-phase to single phase cyclo-converter requires positive and negative group phase controlled converters. Under what conditions, the group work as inverters or rectifiers ? How should the firing angles of the two converters be controlled ? **20**

6. (a) Explain modified sinusoidal pulse width modulation used in PWM inverters. Write the important features of the same. **10**

   (b) What is ac voltage controller ? What are the applications of ac voltage controllers ? Explain types of controls used in ac voltage controllers. **10**

7. Write short notes on the following :— **20**

   (a) SIT, (b) LASCR, (c) GTO, (d) POWER BJT.

23/12/2011 ME ETRX Sem-II
PI & CD

AGJ 2nd half (j+) 18

Con.- 7043-11. **BB-2671**

(3 Hours) **[Total 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) State different sensors used for measurement of temperature in Process Industry. 20
(b) State the basic need while using Cutback Controller.
(c) Explain the various intrinsic safety measures that must be undertaken in process industry.
(d) H-infinity design approach and procedure.

2. (a) Explain with basic blocks the Working of cement industry also specifying each process and controller parameters. 10
(b) Draw a ladder diagram for a two motor system having the following conditions: 10

(i) Starting push button starts Motor 1

(ii) After 10 seconds, Motor 2 is ON

(iii) Stopping the switch stops Motor 1 and 2.

3. (a) Differentiate between continuous and discontinuous controller. Explain how multipoint controller vary than that of ON/OFF controller. 10

(b) What is need of Ratio Controller? Explain the working with Suitable example. 10

4. (a) Draw the block diagram of PID controller. Explain the performance of the same. Draw the waveform for a specific error and explain how different modes will produce the output individually. Draw combined response of the PID controller. 10

(b) Explain the working of water treatment plant with neat block diagram showing the significance of sand filters. 10

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5. (a) Explain in brief the construction and working of following Process Variable measurement : 15

(a) Liquid Level (b) pH

(b) What is Programmable Logic Controller? Explain the basic block diagram. What is the significance of Input and output module in the PLC? 05

6. (a) Explain Ultimate gain and time method of tuning of a controller for the process given below 10

$$G(S) = \frac{1}{(S+1)(S+2)(S+3)}$$

(b) Define Membership function pertaining to Fuzzy controller. Compare Fuzzy logic and classical control system 10

7. Write short note on: (any four) : 20

(a) SCADA System

(b) Active filters

(c) Split Range Controller

(d) What is need of Cascade Controller? Explain the working with Suitable example.

(e) Differentiate between Electronic and Pneumatic Control System.