Roll No. ..... Total Pages : 2

BT-4/M-13 **8465**

BASICS OF ECONOMICS AND MANAGEMENT

Paper : HUM-201(E)

Time : Three Hours] [Maximum Marks : 100

Note : Attempt *five* questions in all, selecting at least *one* question from each unit. All questions carry equal marks.

UNIT–I

1. State and explain the Law of Variable proportion. Is it a universal law ?

2. How is price determined under monopoly ? Should monopoly be controlled and regulated ?

UNIT–II

3. What do you mean by Management ? Is Management a science or an art or profession ?

4. "Fayol's general principles of management provide a basis for development of a Management theory." Comment.

UNIT–III

5. Explain the advantages and disadvantages of Centralisation of authority.

6. Differentiate between the following :

   (a) Planning policy and strategy.

   (b) Delegation of Authority and Decentralisation

UNIT–IV

7. "A selection procedure is like a hurdle race." Comment.

8. Give a brief account of the usual steps involved in the staffing process.

Roll No. ..... Total Pages : 3

BT-4/M-13 **8405**

ELECTRONICS INSTRUMENTATION AND MEASUREMENTS

Paper : ECE-202(E)

Time : Three Hours] [Maximum Marks : 100

Note : Attempt *five* questions in all, selecting at least *one* question from each unit. Assume any missing data. All questions carry equal marks.

UNIT–I

1. Discuss the advantages of the Kelvin Double bridge over the conventional Wheatstone bridge for measurement of low resistance. Draw the circuit of a Kelvin's Double bridge used for measurement of low resistances and derive the condition for balance. Explain clearly how the effect of contact resistance and resistance of leads is eliminated in Kelvin's Double bridge. 5+10+5

2. (a) What are the various general characteristics of an measuring instrument ? Distinguish between Systematic error and Random error. How is random error found out and corrected for ? Also differentiate between Accuracy and Precision with the help of a suitable example. 4+3+2+3

(b) Describe the working of a Carey Foster Slide-wire bridge. 8

UNIT–II

3. (a) Describe how an unknown capacitance can be measured with the help of D'Sauty's bridge. What are the limitations of this bridge and how are they overcome by using modified form of D'Sauty's bridge ? Draw phasor diagram to illustrate your answer. 12

   (b) Describe the working principle of a self-balancing potentiometer with the help of measurements of temperature using thermocouple. Explain clearly why d.c. potentiometer cannot be used for a.c. measurements straight away. 8

4. (a) Describe the principle, circuit diagram and operation of a Differential voltmeter. Explain the different modes of operation of this voltmeter. 8

   (b) What is an X-Y Recorder ? What difference do you find between X-Y recorder and X-t or a Y-t recorder ? Explain with suitable circuit diagram the working of an X-Y recorder. Describe its applications. 2+2+5+3

UNIT–III

5. (a) What do you mean from Harmonic distortion ? Define Distortion factor. Explain with the help of block diagram the working of the heterodyne harmonic analyser and also list the advantages of this method over the other methods used for measurement of harmonic distortion. 12

   (b) Explain a digital method for frequency and time interval measurement. 8

6. (a) For what useful purposes the Digital voltmeters are used ? How one can classify Digital voltmeters ? Explain the working principle, circuit diagram of Integrating Digital Voltmeter. 12

   (b) What are the various Op-Amp parameters ? Explain how one can measure them. 8

UNIT–IV

7. (a) Explain Binary Weighted Resistive type DAC. Calculate the output voltages caused by each bit in a 4-bit ladder if the output levels are 0 (equal to zero volt) and 1 (equal to $V_R = 10$ volt) ? Find the output voltage corresponding to 1101 input. 12

   (b) What is Data Acquisition system ? Explain the working with block diagram of Multi-channel Digital Data Acquisition system. 8

8. (a) How will you measure pressure of the order 10^{-4} torr ? Explain the working principle of Pirani and ionization vacuum gauges and give their merits and demerits. 1+9

   (b) Describe the construction, principle and working of Thermocouples. Describe the Thermo-electric laws and their applications. 8+2

Roll No. ..... Total Pages : 3

BT-4/M-13 **8406**

DIGITAL ELECTRONICS (New)

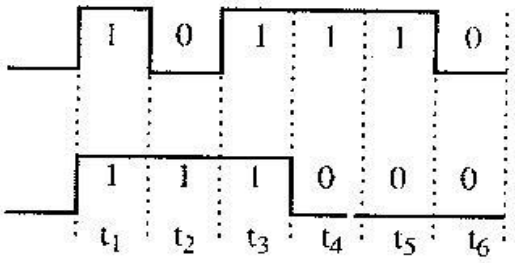
Paper : ECE–204(E)

Time : Three Hours] [Maximum Marks : 100

Note : Attempt *five* questions in all, selecting at least *one* question from each section.

SECTION–I

1. (a) Determine the output Y from AND gate for input waveform A and B.



4

(b) Reduce the following boolean expression :

(i) $\overline{\overline{A\overline{B}+ABC+A(B+A\overline{B})}}$

(ii) $\overline{A\cdot(A+C)}$ 6

(c) Calculate the binary equivalent of 1/3 out to 8 places and then convert from binary to decimal. How close is the result to 1/3 ? 5

(d) What is Excess 3 code ? What are its advantages and disadvantages ? 5

2. (a) Use only NAND gate to design a logic ckt. to simulate the boolean function

$$Y = A + (B + C).$$ 4

(b) Find the canonical form of POS from the canonical form of given SOP.

$$F(A, B, C, D) = \Sigma m(0, 2, 4, 6).$$ 6

(c) Minimize the Logic function using Quinc-Mccluskey method :

$$F(A, B, C, D) = \Sigma m(1, 3, 5, 8, 9, 11, 15) + d(2, 13).$$ 10

SECTION–II

3. (a) Design a BCD-to-7-Segment decoder with active low output using 1:16 demultiplexer and some gates. 7

(b) Draw and explain a binary full adder, using AND gates and OR gates. How can it be realized using two half adders ? 7

(c) What are Encoders and where are encoders used ? 6

4. (a) The JK Master-Slave flip-flop has its J and K inputs tied to $+V_{CC}$, and a series of pulses (actually a square wave) are applied to its ckt. input. Describe the waveform at Q. 5

(b) Draw and explain Shift left register. 5

(c) Design a synchronous BCD (Mod-10) counter using T flip-flops. Use for the design, excitation table of T flip-flops and obtain minimal digital hardware, using Karnaugh maps. Also realize the counter using T flip-flops and basic gates. 10

SECTION–III

5. (a) Explain Switching mode operation of MOS devices. 5

(b) How Fan out is increased in DTL ? Justify your answer. 7

(c) DCTL is considered to be a low power Logic family, why ? Explain with a logic ckt. 8

6. (a) Explain with the proper reasons, why active pull-up and pull-down are preferred over passive in a TTL. 5

(b) Is it possible to use TTL to ECL translator for CMOS-to-ECL interfacing ? Justify your answer. 7

(c) Design a circuit of interfacing an ECL 2 input NOR gate with a TTL inverter to obtain NOR function of the combined ckt. 8

SECTION–IV

7. (a) Discuss the various drawbacks suffered by variable resistive divider type of D/A converters. 6

(b) Find out how bit A/D converter is required to achieve a resolution of 1 mV if the maximum full scale input voltage is 10 volts. 7

(c) Discuss the specifications of A/D converters. 7

8. (a) Design an Excess-3 to BCD code converter using (i) PROM, and (ii) PAL. 10

(b) What is FPGA ? Discuss in brief its advantages. 10

Roll No. ..... Total Pages : 3

BT-4/M-13 **8406–R**

DIGITAL ELECTRONICS (New)

Paper–ECE-204-E

Time Allowed : 3 Hours] [Maximum Marks : 100

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

UNIT–I

1. (a) Starting from the logical equation $F = (A + BC)(B + \overline{C}A)$ minimize the function in POS and SOP forms and realize it with NAND and NOR gates respectively. 10

   (b) What do you mean by the Gray code? What are its applications? 5

   (c) What are the advantages and disadvantages of the Q-M method vis-a-vis the K-map? 5

2. (a) If register A holds $(257)_{10}$, register B holds $(1050)_{10}$ and register C holds their Sum, show the contents of register A, B and C in: (i) Binary form, (ii) BCD form, (iii) Hex. code. 10

   (b) Simplify the Boolean function using K-map $F(w, x, y, z) = \Sigma(1, 3, 7, 11, 15)$ and don't care conditions

   $d(w, x, y z) = \Sigma (0, 2, 5)$. 10

UNIT–II

3. (a) Describe the operations performed by the following logic circuits: (i) Decoder, (ii) Encoder. 10

   (b) Draw the logic diagram and timing diagram of a 3-bit binary ripple-up counter and down counter using positive-edge triggered FFs. 10

4. (a) Carry out a method to convert a D flip-flop to a J-K flip-flop. 10

   (b) Explain the operation of a 4-bit bidirectional shift register with the help of a circuit diagram. 10

UNIT–III

5. (a) Sketch a 2-input ECL gate and explain its operation. 10

   (b) Compare the following Technologies:

   Bipolar and CMOS! 10

6. (a) What are the merits and demerits of the TTL family? 10

   (b) How do open-collector outputs differ from totem-pole outputs? 10

UNIT–IV

7. (a) Define the following parameters of DACs:

   (i) Resolution

   (ii) Accuracy

   (iii) Monotonicity

   (iv) Settling time

   (v) Offset voltage. 10

   (b) Write short note on D/A converting. 10

8. (a) Give the principle of Counter type A/D converter. 10

   (b) Write short note on Read only Memories. 10

Roll No. .....

Total Pages : 2

BT-4/M-13

8411

SIGNAL AND SYSTEM

Paper : EE-208(E)

Time : Three Hours]

[Maximum Marks : 100

Note : Attempt any *five* questions. All questions carry equal marks.

1. (a) Differenatiate between Time variant and Time invariant systems with the help of suitable examples and their mathematical models. How response is determined for deterministic signals ? 10

   (b) Obtain z-transform of the following :

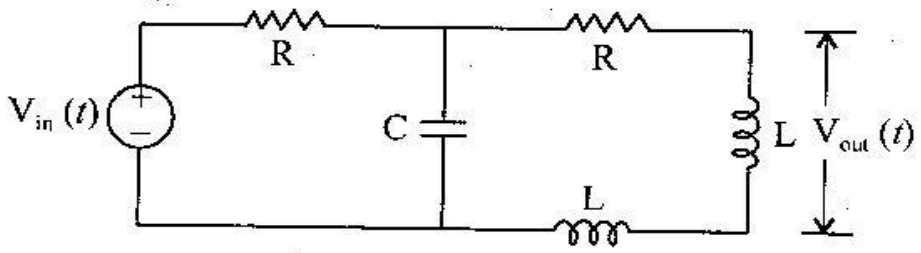
   (i) te^{-at}.

   (ii) $\cos \omega t$. 10

2. (a) Define and prove Initial and Final value theorems of z-transform. 15

   (b) Discuss Causal and Non-causal systems. 5

3. (a) Obtain transfer function of the electrical circuit given below :



15

   (b) Differentiate between SIMO and MIMO systems with the help of suitable examples and their mathematical models. 5

4. (a) Obtain state variable diagram of transfer function given as

$$\frac{(2s^2 + 5s + 6)}{(s^2 + 2s + 2)}.$$ 10

(b) List and explain characterisation of Stochastic signals. 10

5. (a) Discuss pdf and cdf. 10

(b) Obtain impulse response of the system whose transfer function is given as

$$\frac{\omega_n^2}{(s^2 + 2\xi\omega_n s + \omega_n^2)}.$$ 10

6. Write technical notes on the following :

(a) Correlation functions and Probability concepts.

(b) Analog and Discrete/Digital memory. (2×10=20)

7. (a) Differentiate between Deterministic and Stochastic systems. Give examples in each category and give their mathematical models. 10

(b) Define State, State variable, State vector and State space. Also, differentiate between Transfer function models and State space models. 10

8. (a) Define and explain Convolution theorem. What is its utility ? Convolue two signals to exemplify convolution theorem. 15

(b) Discuss effects of under sampling. 5

Roll No. ..... Total Pages : 3

BT-4/M-13 **8404**

MICROPROCESSORS AND INTERFACING

Paper : ECE-216(E)

Time : Three Hours] [Maximum Marks : 100

Note : Attempt *five* questions in all, selecting at least *one* question from each section.

SECTION–I

1. (a) Draw the pin configuration of 8085 microprocessor and explain the functions of all the pins in detail. 10

   (b) Draw and explain the timing diagram for the execution of instruction LSI rp, 16 bit data. 5

   (c) Explain how with external handware TRAP can be masked ? What are the different 8085 vectored interrupts and give the call locations for each interrupt ? Explain each of them. 5

2. (a) Explain the timing diagrams of 8085 when it is executing Memory mapped I/O and I/O mapped. 8

   (b) Design a fully decoded scheme for 32 k × 8 to interface chips of 2k × 8. Discuss loading considerations also. 8

   (c) Write an assembly language program for multiplying two 8-bit binary numbers, result 8-bit. 4

UNIT–II

3. (a) Draw and explain the relevant pin diagram for 8086 microprocessor in Minimum and Maximum mode. 12

   (b) Draw and explain the timing diagram for an Output operation in MX mode of 8086. 8

4. (a) Write down the addressing modes for the following instructions and calculate the physical address for the same making use of the given data :
   Ax = fc39h, bx = 273 fh, cx = 000a, dx = 4c2c, si = 30bch, bp = 2000h, sp = 3000h, di = fc32h, cs = 4000h, ds = 7000h, es = 5000h, ss = 1000h, displacement = 0010h.
   (i) Mov al, bh; (ii) Mov bl, [bp]; (iii) Mov cx, [1234]; (iv) Mov dx, 1234h; (v) Mov cx, disp [si]; (vi) Mov al, [bx] [di]; (vii) mov cx, disp [bx] [si]. 12

   (b) Generate HEX codes for the following instructions :
   Mov SS:0F246H [BP], Dx
   Mov [0874], Cx 8

UNIT–III

5. (a) Interface DAC with an 8086 microprocessor running at 10 MHz speed and write an ALP to generate a saw tooth waveform of period 5 ms with V_{max} 2 V. 10

   (b) Configure port A in bidirectional mode and port B in input mode. Draw the CWR and BSR. Also write an assembly language program for the same. 10

6. (a) Interface a 4*4 keyboard with 8086 using 8255 and write ALP for detecting a key closure and return the key code in AL. The debouncing period for key is 20 ms. 12

   (b) Write a program to find out any power of a number such that $Z = X^N$, where N is programmable and X is a unsigned number. 8

UNIT–IV

7. (a) Write down the steps involved when an interrupt INT 88h is encountered in the main program, and calculate address of ISR for this interrupt. 5

   (b) Describe the interrupt vector table of 8086 microprocessor. Discuss the various sources of interrupt in 8086. 7

   (c) Draw the block diagram of 8237 chip and discuss its command word. 8

8. Explain briefly the following :
   (i) 8259 Chip. 8
   (ii) Pipelining. 6
   (iii) Assembler Directives. 6

Roll No. ..... Total Pages : 5

BT-6/M-13 **8609**

CONTROL SYSTEM ENGINEERING
Paper : ECE-302(E)

Time : Three Hours] [Maximum Marks : 100

Note : Answer *five* questions in all, selecting at least *one* question from each unit. All questions carry equal marks. Use semi-log graph papers wherever necessary.

UNIT–I

1. (a) Discuss with typical illustrations, the merits and demerits of Close loop control system over Open loop control system. 5

(b) Fig. 1 gives the signal flow graph of a system with two inputs and two outputs. Find the expression for output C_1 and C_2. Also determine the condition that makes C_1 independent of R_2 and C_2 independent of R_1.

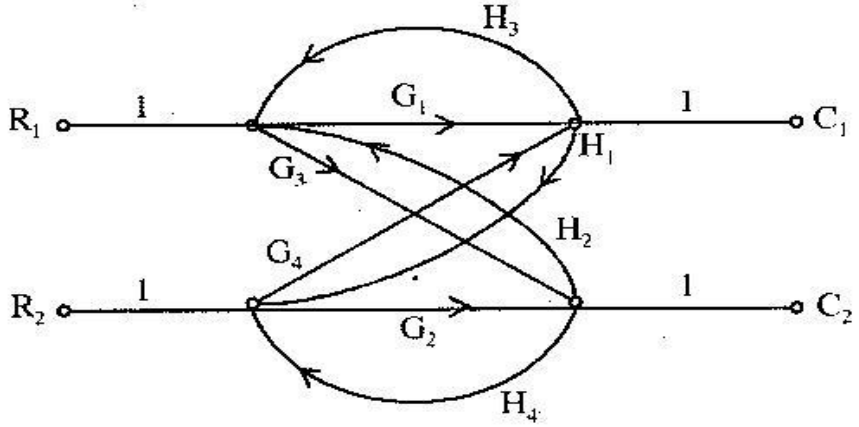


Fig. 1. 10

(c) Write note on the control of the effect of disturbance signals by use of feedback. 5

2. (a) For a mechanical system shown in Fig. 2, find overall transfer function of the system.

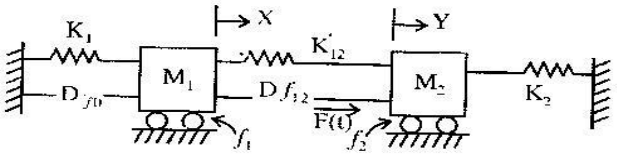


Fig. 2.

Here $f(t)$ is force, M_1 and M_2 are masses. 8

(b) Using block diagram reduction technique, find the output C(s) for block diagram shown in Fig. 3. Also find the corresponding signal flow graph (SFG) and the resulting T.F. using Mason's gain formula.

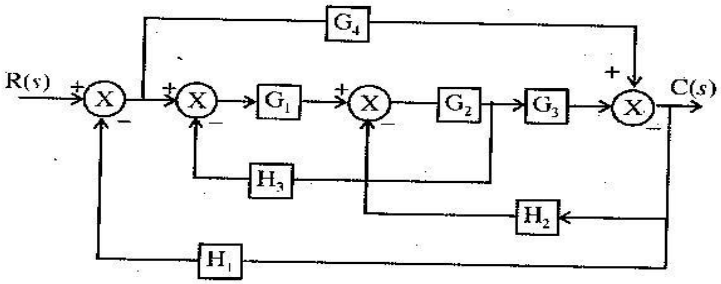


Fig. 3. 12

UNIT–II

3. (a) Define the various time specifications of second order system. Also derive the expressions for rise time, t_r, peak of overshoot, m_p, peak time, t_p, settling time, t_s and steady state error, e_{ss} for IInd order control system subjected to unit step input. 14

(b) Find K to limit the error of the system for the input

$$r(t) = 1 + 8t + \frac{18}{2}t^2$$

to be 0.8 having

$$GH(s) = \frac{K}{s^2(s+1)(s+4)}.$$ 6

4. (a) Sketch root locus plot as 'K' varied from 0 to ∞ for the feedback system whose O.L.T.F. is

$$GH(s) = \frac{K}{s(s+3)(s^2+2s+2)}.$$

Find the range value of 'K' for which the system is stable. What is the highest value of K which can be used before continuous oscillations occur ? Also determine the frequency of continuous oscillations. Clearly write each step for sketching of root locus plot. 13

(b) Point out the limitation of Routh-Hurwitz stability criterion. O.L.T.F. of a unity feedback control system is given as

$$G(s) = \frac{K}{s(Ts+1)}.$$

Determine the value of K and T required so that the root of characteristic equation of closed loop control system are more negative than $s = -a$. 2+5

UNIT–III

5. Describe Nyquist stability criterion with the help of an example and explain how relative stability of control system is determined by Nyquist stability criterion. Sketch Nyquist

plot for unity feedback control system characterized by an open loop transfer function (O.L.T.F.) 20

$$G(s) = \frac{K}{s(0.2s + 1)(0.05s + 1)}.$$

Find

(i) GM and PM for K = 1.

(ii) Range values of 'K' for which the system is stable.

(iii) Value of 'K' for GM to be 20 dB.

(iv) Value of 'K' for PM to be 40°.

6. (a) Consider a unity feedback control system with an O.L.T.F.

$$G(s) = \frac{4s}{s^2(s + 1)(2s + 1)}.$$

Sketch Nyquist plot and find the stability of close loop system. 8

(b) The O.L.T.F. of a unity feedback system is

$$G(s) = \frac{K}{s(0.5s + 1)(0.05s + 1)}.$$

Sketch Bode plot and determine the following :

(i) Value of 'K' for GM to be 10 dB.

(ii) Value of 'K' for PM to be 50°. 12

UNIT–IV

7. (a) A unity feedback system is characterized by an open loop transfer Function (O.L.T.F.)

$$G(s) = \frac{5}{s(s + 1)(s + 0.5)}.$$

It is desired to obtain the phase margin of at least 40° and gain margin of at least 10 dB without sacrificing the velocity error constant of the system. Design a suitable cascade compensator using Bode plot technique. Give the reason for your choice of the compensation scheme. 15

(b) Define State variables. Justify the statement "State models are not unique but number of state variables of a control system is unique." 2+3

8. (a) Explain the concept the controllability and observability of a control system. Derive the necessary and sufficient conditions for the controllability and observability. Examine the controllability and observability for the system described by the state equation

$$\frac{Y(s)}{U(s)} = \frac{(s + 3)}{s^3 + 9s^2 + 26s + 24}.$$ 4+5+6

(b) Show that the lead and lag compensators usually give successful design only if system dynamics is dominated by real poles. Suggest compensation schemes for the plant dominated by complex conjugate poles. 5

Roll No. .....

Total Pages : 3

BT-6/M-13

8610

VHDL AND DIGITAL DESIGN

Paper : ECE-304(E)

Time : Three Hours]

[Maximum Marks : 100

Note : Attempt *five* questions in all, selecting at least *one* question from each unit.

UNIT–I

1. (a) Explain the architecture of a macro-cell. Give product term allocation schemes for macro-cells. (10)

   (b) Explain the terminology Synthesis, Optimization and Fitting in relation to VHDL. (10)

2. (a) What is a Programmable logic device ? Explain EPROM and EEPROM cells used to establish the programmable connection. (10)

   (b) Make Full adder circuit using PLA. (10)

UNIT–II

3. (a) With suitable example, statements and timing charts, explain the difference between transport and inertial delay in VHDL. (10)

   (b) Write the code of string detector that takes as input a serial bit stream and output a '1' whenever the sequence "111" occurs. Overlaps must be considered. (10)

4. (a) A VHDL program has signals A, B, C, and D of type integer. The signals are initialized to A = 1, B = 2, C = 3, and D = 0. The program contains the following statements :

A<= B;

B<=C;

C<= D;

Assume that D changes to 4 at time = 10. Explain the difference in the way sequential and concurrent statements are executed. (10)

(b) Write the Structural VHDL Description of the following circuit in Fig. 1. 10

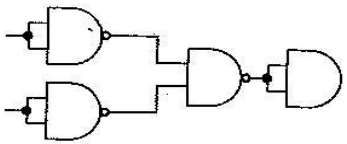


Fig. 1.

UNIT–III

5. (a) Write a VHDL code to make a Generic comparator as given in Fig. 2. (10)

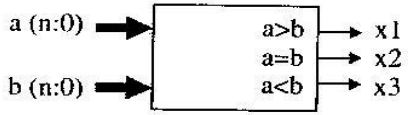


Fig. 2.

(b) Make a VHDL package that utilises full adder components and make use of it for making the main code of full adder. (10)

6. (a) Write procedure for sorting two inputs of byte size. Use this procedure for making final main code of sorting of the two said bytes. (10)

(b) Use Concatenation operator to write VHDL code for making four bit subtractor. (10)

UNIT–IV

7. (a) Write VHDL code to implement Latch with a Guarded BLOCK statement. (10)

(b) Use generate syntax to generate a VHDL code of 8-bit binary to gray code converter. (10)

8. (a) Give the usage of Alias in dealing with a signal of large vector with suitable examples. (10)

(b) Synthesise the following function using 2:1 MUX :

F1 = A1.A3 + A2.A3 (10)

Roll No. .....

Total Pages : 3

BT-6/M-13

8611

DIGITAL SIGNAL PROCESSING

Paper : ECE-306(E)

Time : Three Hours]

[Maximum Marks : 100

Note : Attempt *five* questions in all, selecting at least *one* question from each unit. All questions carry equal marks.

UNIT–I

1. (a) Determine if the system having the following system function is stable :

$$H(z) = \frac{1 + 0.5z^{-1}}{1 - 2.8z^{-1} + 1.6z^{-2}}; \text{ ROC} : |z| > 2. \qquad (10)$$

(b) Determine the causal signal $x(n)$ having the z-transform

$$X(z) = \frac{1}{(1 - 2z^{-1})(1 - z^{-1})^2}. \qquad (10)$$

2. (a) Compute the N-point DFT of the signal

$$x(n) = \begin{cases} 1; & n \text{ even} \\ 0; & n \text{ odd} \end{cases}; \quad 0 \le n \le N - 1,$$

and show the magnitude and phase spectra. (10)

(b) Describe the 8-point, radix-2 decimation in time algorithm of FFT computation and obtain its signal flow graph. (10)

UNIT–II

3. (a) Obtain the direct form I and direct form II structures for the following system :

$$y(n) = -0.1y(n-1) + 0.72y(n-2) + 0.7x(n) - 0.252x(n-2).$$

(10)

(b) Describe the effect of finite word length on the performance of FIR filter structures. (10)

4. (a) Obtain the cascade and parallel structures for the following system :

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

(12)

(b) For the following causal IIR system determine the equivalent lattice-ladder structure and check if the system is stable :

$$H(z) = \frac{1 + 2z^{-1} + 3z^{-2} + 2z^{-3}}{1 + 0.9z^{-1} - 0.8z^{-2} + 0.5z^{-3}}.$$ (8)

UNIT–III

5. (a) Discuss the advantages and disadvantages of FIR filters. How does the filter order of an FIR filter affect its response ? (8)

(b) With the help of a suitable example, explain the design of a band pass filter using Hanning window. (12)

6. (a) Describe the procedure for design of optimum equiripple linear phase FIR filters. (10)

(b) Determine the coefficients of a linear-phase FIR filter of length M = 15 which has a symmetric unit sample response and a frequency response that satisfies the conditions

$$H\left(\frac{2\pi k}{15}\right) = \begin{cases} 1; & k = 0, 1, 2, 3 \\ 0.4; & k = 4 \\ 0; & k = 5, 6, 7. \end{cases}$$ (10)

UNIT–IV

7. (a) Design a digital low-pass Butterworth filter using bilinear transformation method to meet the following specifications :

Pass band ripple $\leq$ 2 dB; pass band : 0–4 kHz; stop band attenuation $\geq$ 20 dB; stop band : 2.1–4 kHz; sampling frequency = 10 kHz. (10)

(b) Explain the procedure for designing a digital IIR filter in frequency domain. (10)

8. (a) Convert the analog filter with following system function into a digital IIR filter by means of the impulse invariance method :

$$H(s) = \frac{s + 0.1}{(s + 0.1)^2 + 9}.$$ (10)

(b) Describe the Pade approximation least squares method of designing a digital filter. (10)

Roll No. .....

Total Pages : 3

BT-6/M-13

8612

DIGITAL COMMUNICATION

Paper : ECE-308(E)

Time : Three Hours]

[Maximum Marks : 100

Note : Attempt *five* questions in all, selecting at least *one* question from each unit.

UNIT–I

1. (a) What is Nyquist rate ? Why the sampling below the Nyquist rate results in frequency aliasing ? Explain. 10

(b) How will you obtain pulse amplitude modulation ? Explain with proper circuit diagram and respective waveforms. 10

2. (a) What is Quantization noise ? How will you minimize it ? 6

(b) Describe the following :

(i) Delta modulator

(ii) Adaptive Delta Modulator. 7+7

UNIT–II

3. (a) What is Matched filter ? Also describe its properties. 6

(b) What is Channel delay distortion ? How does it result in intersymbol interference ? Explain. 8

(c) State and explain Nyquist condition for zero ISI. 6

4. (a) Illustrate how a linear equalizer compensates for the linear distortion in the channel. 6

(b) Discuss the effect of ISI on eye pattern for a binary amplitude shift keying scheme. 6

(c) Write a brief note on LMS algorithm for equalization. 8

UNIT–III

5. (a) What is Gram-Schmidt procedure ? Illustrate how this procedure is used to construct orthonormal waveforms. 10

(b) A set of M signal waveforms $\{s_{lm}(t)\}$ are complex-valued. Derive the equation for the Gram-Schmidt procedure that will result in a set of $N \leq M$ orthonormal signal waveforms. 10

6. (a) Give the signal space diagram for digital M-ary simplex signals. 6

(b) Discuss the power spectra of linearly modulated signals. 6

(c) Discuss bit error rate performance of QPSK. 8

UNIT–IV

7. (a) Discuss a typical method for impressing the PN sequence on the transmitted signal for a DS spread spectrum system. 8

(b) Show a typical demodulator structure for PN spread spectrum signals and explain it. 8

(c) Discuss the antijamming application of DS spectrum signals. 4

8. (a) What is Frequency hopped spread spectrum ? Give its block diagram and explain the function of each block. 10

(b) A CDMA system utilizing DSSS and binary PSK modulation has a processing gain of 1000. Determine the number of users assuming that each user has equal power and the desired level of performance is an error probability of 10^{-6}. 10

8. (a) Diagrammatically explain the basic model of File Transfer Protocol (FTP). Also specify various components of client and server. With the help of diagram, explain Communication over Control connection in detail. 10

(b) Compare Symmetric key cryptography and Asymmetric key cryptography. 5

(c) Differentiate between the Substitution ciphers and Transposition ciphers using appropriate examples. 5

Roll No. ..... Total Pages : 4

BT-6/M-13 **8613-R**

COMPUTER COMMUNICATION NETWORK

Paper : ECE-310(E)

Time : Three Hours] [Maximum Marks : 100

Note : Attempt *five* questions in all, selecting at least *one* question from each unit.

UNIT–I

1. (a) Differentiate between LAN, MAN and WAN using appropriate examples. Compare Logical topology and Physical topology using diagrams and appropriate examples. 10

(b) Explain the functionalities of various layers of the TCP/IP reference model. Explain the critique of the TCP/IP model in detail. Use appropriate diagrams and examples. 10

2. (a) Information can be transmitted over wires by varying some physical property such as voltage or current. By representing the value of this voltage or current as a single-valued function of time, we can model the behaviour of signal. Analyze it mathematically using fourier analysis. 10

(b) Explain the working of a typical VSAT (Very Small Aperture Terminal) system using appropriate diagram. 10

UNIT–II

3. (a) During a data communication, the initial frame is 1101011011. What will be the final transmitted frame if the polynomial code checksum is used as the error detecting code and the generator polynomial is $x^4 + x + 1$? Using an example error, also specify how it can be used to detect errors. 10

   (b) Compare Satellite network communication and Fibre optic network communication using supporting examples. 10

4. (a) Explain the various features and purposes of the point-to-point protocol. Also explain its frame format. 10

   (b) Explain the basic concept of Sliding window protocol. Show the situations of a sliding window of size 1, with a 3-bit sequence number, at sender and receiver side for the following situations :

   (i) Initially.

   (ii) After the first frame has been sent.

   (iii) After the first frame has been received.

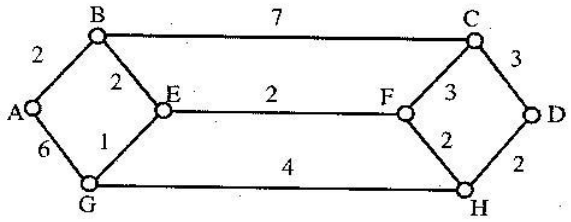
   (iv) After the first acknowledgement has been received. 10

UNIT–III

5. (a) Explain the various services provided by network layer to the transport layer in brief. Compare Virtual-circuit subnet and Datagram subnet. 10

   (b) Differentiate between Sessions and Connections. Explain connection management in detail with the help of diagram. 10

6. (a) Explain the basic principle of Shortest path routing. Use this algorithm to find the shortest path from node A to node D for the following graph : 10



   (b) With the help of a diagram, explain the concept of Concatenated virtual circuits. 5

   (c) Differentiate between Transparent fragmentation and Non-transparent fragmentation using appropriate diagram. 5

UNIT–IV

7. (a) With the help of an example, prove that compression is needed to send Audio or Video over the Internet. Explain the JPEG (Joint Photographic Experts Group) method of image compression using appropriate example. 10

   (b) With the help of an example, explain the working of SMTP (Simple Mail Transfer Protocol). How it can be used to transfer an e-mail message ? 10

Roll No. ..... Total Pages : 2

8708

BT-7/M-13

VLSI DESIGN

Paper–ECE-401-E

Time Allowed : 3 Hours] [Maximum Marks : 100

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

UNIT–I

1. Explain the CMOS fabrication process sequence with the help of proper labelled illustrations. 20

2. (a) Derive the drain current equation for a NMOS transistor using gradual channel approximation. Clearly state your assumptions. 12

   (b) Draw the stick diagram of an XOR gate in E/D NMOS process. 8

UNIT–II

3. Discuss the combined scaling theory. How do you derive the constant field and constant voltage theories from it? Analytical show the scaling of delay, power dissipation, power density and Power-Delay product. 20

4. (a) What do you understand by layout environment? Explain. 10

   (b) Write short note on Algorithm Paradigms. 10

UNIT–III

5. (a) What do you understand by Global and local routing? Discuss some routing algorithms. 10

   (b) What is floor planning? Why does it play an important role in IC design? Discuss. 10

6. What do you understand by Dijkstra's shortest path algorithm? Explain it. Discuss how Lee's theorem can be considered to be a version of it? 20

UNIT–IV

7. What are the sources of power in VLSI circuits? Discuss. Also discuss the power minimization techniques.

   20

8. Discuss the following :

   (a) Power Minimization

   (b) Layout Delay models. 20

Roll No. ..... Total Pages : 2

BT-8/M-13 **8810**

WIRELESS & MOBILE COMMUNICATION

Paper–ECE-402-E

Option–II

Time Allowed : 3 Hours] [Maximum Marks : 100

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit.

UNIT–I

1. Explain the following terms :
   (a) Shadowing and multipath fading delay spread
   (b) Doppler spread. 2×10=20
2. Discuss the following in detail :
   (a) Models for path loss
   (b) Coherence bandwidth and coherence time. 2×10=20

UNIT–II

3. Discuss the concept of digital modulation for mobile radio. Make an analysis of this concept under fading channel. 20
4. Explain the diversity and spread spectrum techniques in detail. 20

UNIT–III

5. (a) What is spectrum efficiency? How is it computed for cellular systems. 10

(b) Explain the following terms :

(i) FDM and TDM

(ii) Cellular CDMA. 10

6. (a) Discuss the channel allocation schemes in detail. 10

(b) Describe the handover analysis process in mobile communication. 10

UNIT-IV

7. Make a comparison between wireless standards GSM and UMTS-IMT-2000. 20

8. Discuss the following :

(a) Mobility management and location tracing

(b) Signalling and call control. 2×10=20

Roll No. ..... Total Page : 1

BT-7/M-13 **8709**

TELEVISION ENGINEERING

Paper–ECE-403-E

Time Allowed : 3 Hours] [Maximum Marks : 100

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit.

UNIT–I

1. (a) What is interlace scanning in TV? Why we need to use interlace scanning? 15
   (b) Write short note on Vestigial side band transmission and reception. 5
2. With suitable diagrame explain composite video signal dimensions. 20

UNIT–II

3. With suitable block diagram explain structure and working of image Orthicon camera tube and vidicon. 20
4. Write short note on Yagi-Uda antenna, Log periodic antenna and Turnstile Antenna. 20

UNIT–III

5. With suitable block diagram explain working of PAL transmitter and Receiver System. 20
6. Explain working of delta gun color picture tube. 20

UNIT–IV

7. Write short note on Projector TV and 3 D–TV. 20
8. Write short note on Cable TV and CCTV. 20

Roll No. ..... Total Pages : 2

BT-8/M-13 **8811**

RADAR ENGINEERING

Paper–ECE-404-E

Time Allowed : 3 Hours] [Maximum Marks : 100

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit.

UNIT–I

1. Find the relation between transmitted power and range in radar. 20

2. Write short notes on the following :
   (a) Minimum detectable signal for radar receiver. 7
   (b) Propagation effects in relation to radar receiver. 7
   (c) System losses in radar. 6

UNIT–II

3. With suitable block diagram, explain the working of Non-coherent M.T.I. and pulse doppler radar. 20

4. With suitable block diagram, explain the working of frequency modulated CW radar and multiple frequency CW radar. 20

UNIT–III

5. What do you understand by acquisition of target? Explain the various methods of antenna scanning. 20

6. Write short notes on the following :

(a) Monopulse tracking radar. 10

(b) Tracking in range. 10

UNIT–IV

7. For what purpose we are using duplexer? Explain basic operations and requirements of duplexer. Also explain various type of duplexers used in radar system. 20

8. Write short notes on the following :

(a) Radar displays

(b) Receiver protectors in Radar system. 10×2=20

Roll No. .....

Total Pages : 3

BT-8/M-13

8812

MULTIMEDIA COMMUNICATION

Paper–ECE-406-E

Time Allowed : 3 Hours] [Maximum Marks : 100

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit.

UNIT-I

1. (a) Explain the basic form of representation of the following:

   (i) Text

   (ii) Image

   (iii) Audio

   (iv) Video. 8

   (b) With the help of an appropriate diagram, discuss the function of a telephony gateway in relation to Internet telephony. 8

   (c) A Web page of 10 Mbytes is being retrieved from a Web server. Assuming negligible delays within the server and trunk network, determine the time to transfer the page over a PSTN modem operating at 28.8 kbps. 4

2. (a) Explain the operating principle of video-on-demand. Also justify the bandwidth requirements for this application. 10

(b) Determine the bit are that results from the digitization of a 525-line and a 625-line system using the 4:2:0 digitization format and interlace scanning. Also calculate the amount of memory required to store a 2-hour movie. 10

UNIT–II

3. (a) Explain the following in brief:

(i) Run-length encoding

(ii) Statistical encoding

(iii) Source coding

(iv) Differential encoding

(v) Transform encoding. 10

(b) Disuss the operating principle of LZ compression algorithm. Assuming a dictionary of 16,000 words and an average word length of 5 bits, determine the average compression ratio achieved relative to using 7-bit ASCII codewords. 10

4. (a) What is Graphics Interchange Format? Explain its compression principle. 10

(b) Discuss the following:

(i) Tagged Image File Format

(ii) JPEG. 10

UNIT–III

5. (a) With the help of appropriate schematics and timing diagram, explain the working principle of differential pulse code modulation. 10

(b) Discuss Dolby audio coders in detail. 10

6. (a) Explain the basic principles of the Video compression. 10

(b) Explain how the compression algorithm used with MPEG–1 differs from that used in the H.261 standard. 10

UNIT–IV

7. (a) What is the need of domain name system? Explain the name structure and administration. 10

(b) With the help of an appropriate diagram, discuss the sequence of query/response messages that are exchanged to carry out an iterative name-to-address resolution. 10

8. (a) Show the structure of E-mail message and explain it. 10

(b) Write a detailed note on Internal Telephony. 10

(b) An IMPATT diode has a pulse operating voltage of 100 V and pulse operating current of 0.9 A. If the efficiency is about 10%, calculate the output power, the duty cycle if the pulse width is 0.01 ns and frequency is f = 16 GHz. 4

(c) Explain Two valley Model theory in the context to GUNN diode. 6

8. (a) Explain operation of Parametric Amplifiers and discuss Manley-Rowe power relations with equivalent circuit. 10

(b) Compare performance characteristics of TRAPATT and BARITT diodes. 10

Roll No. ..... Total Pages : 4

BT-7/M-13 **8711**

MICROWAVE ENGINEERING

Paper–ECE-407-E

Option–I

Time Allowed : 3 Hours] [Maximum Marks : 100

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

UNIT–I

1. (a) What do you mean by Quality factor of a Resonant Circuit? Derive the expressions for quality factor of a Cavity Resonator and explain Critical coupling, Over coupling and Under coupling coefficients by giving relationship between Coupling coefficient and Standing wave ratio. 2,4,6

(b) Find four lowest resonant frequencies and the TE modes of oscillations in the air filled rectangular cavity resonator with dimensions $4\times3\times4$ cm^3. 8

2. (a) Explain two methods to measure microwave frequency using necessary block diagrams and necessary formulas. 5,5

(b) For a lossless line of 75Ω when terminated over an unknown impedance two consecutive voltage minima are 20 cm apart with a SWR of 3. When the impedance is connected replacing the short,

the shift in the minimum is 6 cm towards the (i) load (ii) source. Find the impedance connected to the line in both cases. 5,5

UNIT–II

3. (a) Derive the expressions for Power required to bunch the electron beam in a two cavity klystron Amplifier. 7

   (b) A TWT operates at f = 2GHz. The slow wave structure has a pitch angle of 5.7°. Assuming lossless tube determine the propagation constant. 3

   (c) For a Reflex klystron working at f = 3GHz, calculate the change in frequency for a 3% change in Repeller voltage when V_r = 2.5 kV, V_0 = 600 V, L = 2 cm and the mode is $1^{3/4}$. 10

4. (a) How the field in a Helical slow wave structure of TWT is distributed, derive necessary expressions and diagrams in support of your answer. 10

   (b) Explain phase Focusing effect in a cavity magnetron. 5

   (c) An X-band conventional magnetron has an anode voltage of V_0 = 40 kV and current I_0 = 60 A. It is applied as an axial magnetic flux density of B_0 = 0.02 Wb/m^2. Th radii of cathode and anode are a = 5 cm and b = 10 cm respectively. Calculate cyclotron angular frequency, Hull cut-off voltage and Hull cut-off magnetic field. 2,2,1

UNIT–III

5. (a) Prove that, for a lossless junction the scattering matrix is a unitary matrix. 5

   (b) A generator matched to the port with an available power of 2W is connected to the H-arm of magic tee. The E-arm port is match terminated and the coplanar arm ports are connected to $2Z_0$, $3Z_0$ and Z_0 being the characteristic impedance of arms. Assuming same length of coplanar arms, calculate the SWR into H-arm, the power delivered to loads at various ports and power reflected at port H-arm port. 3,4,3

   (c) List the applications of Directional coupler. 5

6. (a) Describe the working of Rotary Phase Shifter by giving its structural details using necessary diagram. 8

   (b) A three port Circulator has an insertion loss of 1dB, isolation 30 db and VSWR = 1.5. Find its S-matrix. 5

   (c) Explain the working of Rotary vane type attenuator using necessary structural details with diagrams. 7

UNIT–IV

7. (a) Determine the criterion for classifying the modes of operation of Gunn diode and explain following Gunn Operational mode :

   (i) Transit Time Mode

   (ii) Delayed Domain Mode

   (iii) Quenched Mode

   (iv) LSA Mode. 2+4×2=10

Roll No. ..... Total Pages : 2

BT-8/M-13 **8818**

TRANSDUCER & THEIR APPLICATIONS

Paper–ECE-430-E

Time Allowed : 3 Hours] [Maximum Marks : 100

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

UNIT–I

1. What do you mean by Transducer? Differentiate between Primary and Secondary Transducer. 20

2. Describe the construction and working of following types of transducer :

   (a) Piezoelectric

   (b) Hall effect. 20

UNIT–II

3. (a) A thermistor has a resistance of 3980Ω at the ice point (0°C) and 794Ω at 50°C. The resistance temperature relation is given by

$$R_T = a\, R_0\, exp\left(\frac{\delta}{T}\right).$$

   Calculate the constant a and b. Also calculate the range of resistance to be measure in case the temperature varies from 40°C to 100°C. 10

(b) Define pyrometer. What is its principle of operation? State the applications where pyrometer is used. 10

4. Explain the measurement of pressure by using :

(a) Pirani Gauge

(b) Ionization Gauge. 20

UNIT–III

5. Explain the construction and working of :

(a) Electromagnetic Tachometers

(b) Photoelectric Tachometer. 20

6. Explain the circuit of strain guage using ballast circuit. A strain gauge having resistance of 120Ω and gauge factor of 2 is subjected to a strain of

$$(60 + 10 \sin 314\ t) \times 10^{-6}.$$

Find the expression for the change in output voltage when the strain gauge is connected in Ballast circuit having ballast resistance of 120Ω and input voltage of 6 volt. 20

UNIT–IV

7. Explain strain guage load cell with the help of diagram. Give the accuracy of this device. What are their advantages and limitations? 20

8. Explain :

(a) Absorption dynamometer

(b) Torsion meter. 20

Roll No. ..... Total Pages : 2

BT-8/M-13 **8815**

EMBEDDED SYSTEM DESIGN

Paper–ECE-424-E

Time Allowed : 3 Hours] [Maximum Marks : 100

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

UNIT–I

1. (a) Discuss the complete history and generations of microcontroller. 8

   (b) How many hardware interrupts has the 8051? How are they activated? 12

2. (a) Differentiate :

   (i) Harvard vs. Princeton architecture

   (ii) CISC V(S) RISC. 10

   (b) Discuss the criteria for choosing a microcontroller. 5

   (c) Discuss various interrupts in microcontroller. 5

UNIT–II

3. What do you mean by PIC18 microcontroller? Discuss its architecture in detail. 20

4. (a) Discuss the instruction (ALL) pushing and popping. 10

(b) Discuss various addressing modes of PIC microcontroller. 10

UNIT–III

5. (a) Write a short note on UART. 10

(b) List out the interrupts in the PIC microcontroller and explain. 10

6. (a) Explain the modes of operation of times in a PIC microcontroller. 10

(b) Write a short note on synchronous serial port module. 10

UNIT–IV

7. (a) Write a program to add 7FGAH to BC48H and save the result in RAM memory location starting at 40H. 12

(b) Explain the difference between the C and OV flags and where each one is used. Explain flag register of PIC. 8

8. (a) What is PWM and how is it used in DC motor control? 8

(b) Write a program to get the hour and minute data in BCD and send it to ports PORT B and PORT D. 12