G 375 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Sixth Semester

Branch : Electronics and Communication Engineering

EC 010 603—RADIATION AND PROPAGATION (EC)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. Define antenna radiation patterns. What is its significance ?
2. Explain the features of binomial array.
3. What are the different modes of operation of helical antenna ?
4. Explain the limitations of ground wave propagation.
5. How will you measure the effective gain of an antenna ?

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Define (i) Beam efficiency ; and (ii) Antenna efficiency.
7. Define and explain array factor.
8. What are the various effects of antenna height ?
9. Define (i) MUF ; and (ii) Virtual height.
10. How will you measure the polarization of an antenna ?

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. (a) Explain various antenna field zones and their boundaries with neat sketches.

    (b) Obtain an expression for radiation resistance of an oscillating current element.

Or

Turn over

12. (a) State and derive reciprocity theorem.

    (b) Differentiate half-wave dipole from quarter wave monopole.

13. Explain the radiation pattern multiplication with a neat sketch.

Or

14. Explain the principle of operation of broad side array with neat sketch.

15. Explain the structure and working of Rhombic antenna.

Or

16. Explain the working of log-periodic antenna and its design.

17. Explain the factors involved in the propagation of radiowaves.

Or

18. Explain the structure of ionosphere. Derive the characteristic equation of ionosphere.

19. How will you measure the directional pattern of an antenna ?

Or

20. Define the steps to measure the range of an antenna.

(5 × 12 = 60 marks)

G 386 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Sixth Semester

Branch : Electronics and Communication Engineering

EC 010 604—COMPUTER ARCHITECTURE AND PARALLEL PROCESSING (EC)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. What is the use of condition codes ?
2. Compare sign-magnitude, 1's complement and 2's complement forms of number representations.
3. Write a note on memory-mapped I/O.
4. What are the hazards of pipelining ?
5. Write a note on USB.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. List the factors that affect the performance of CPU.
7. Write a note on fast adders.
8. Explain the concept of virtual memory.
9. Briefly explain multithreading.
10. What are the differences between multiprocessors and multicores ?

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. Explain superscalar architecture. What is meant by instruction level parallelism ?

Or

12. Explain various addressing modes.

Turn over

13. Explain Booth's algorithm, with example. Explain fast multiplication technique.

Or

14. Explain hardwired and microprogrammed control.

15. Explain direct, associative and block-set associative mapping techniques used in Cache memory, with examples.

Or

16. (a) Explain interrupt handling techniques.

(b) Explain dynamic memories.

17. Explain various interconnection networks.

Or

18. Explain message passing architecture.

19. Explain various hardware units of PC.

Or

20. Explain the evolution and features of Pentium processor series.

(5 × 12 = 60 marks)

G 398 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Sixth Semester

Branch : Electronics and Communication Engineering

EC 010 605 – MICROCONTROLLERS AND APPLICATIONS (EC)

(New Scheme – 2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

1. Mention the features of 8051 μC.
2. Explain the arithmetic instruction of 8051 μC with an example.
3. Write briefly about the functions of ports in 8051 μC.
4. Name the different types of display interfacings.
5. Write short notes on pipelining in PIC μC.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. Draw the pin diagram of 8051 μC.
7. Write an ALP for multiplying two 8-bit numbers in 8051 μC.
8. Draw the Timer 0 format of 8051 and explain them in detail.
9. The following shows crystal frequency for three different 8051-based systems. Find the period of the machine cycle in each case :
   (a) 22 MHz.
   (b) 11.0592 MHz.
   (c) 18 MHz.
10. Explain with an example the interrupts of PIC 18 microcontroller.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 12 *marks.*

11. Draw the functional block diagram of 8051 microcontroller and explain them in detail.

Or

12. With a neat sketch, explain the I/O ports of 8051 μC.

13. Explain in detail the different instruction sets supported by 8051 μC.

Or

14. Assume that bit P 3.2 is an input and represents the condition of an oven. If it goes high, it means that the oven is hot. Monitor the bit continuously, whenever it goes high, send a high-to-low pulse to port P 1.5 to turn on a buzzer.

15. Write a program to generate a signal having 50% duty cycle with wavelength of 10 m using 8051.

Or

16. Write a program to send only one bit at a time by interfacing with 8051 μC.

17. With neat diagram, explain the interfacing of stepper motor with 8051 μC.

Or

18. With an application, explain the ADC interfacing with 8051 μC.

19. Draw the memory organization of PIC 18 microcontroller along with its advantages.

Or

20. What is meant by interrupt? Explain the interrupt structures of PIC 18 μC.

(5 × 12 = 60 marks)

G 357 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Sixth Semester

Branch : Electronics and Communication Engineering

EC 010 601 – DIGITAL COMMUNICATION TECHNIQUES (EC)

(New Scheme – 2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions briefly.*

Each question carries 3 *marks.*

1. What is Correlation? Explain the different types.
2. Explain a ML Receiver.
3. What is Companding? Explain.
4. What is the need of equalizer in digital transmission? Briefly explain.
5. Explain about BPSK Signal.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. Write the differences between :
   (a) Sample function and Random process.
   (b) Wide sense stationarity and Strict sense stationarity.
7. Write the properties of matched filter receiver.
8. With a diagram, explain the generation of PPM Signal.
9. Explain modified duobinary signalling scheme.
10. Explain about Trellis coded modulation.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 12 *marks.*

11. With a suitable example, explain Gram-Schmidt orthogonalization procedure. (12 marks)

Or

12. (a) Derive the mean and auto correlation function at the output of a LTI System when a Stationary random process X (t) is given at the input.

    (b) Write the properties of P.S.D.

(8 + 4 = 12 marks)

13. (a) With a neat block diagram, explain the operation of a matched filter receiver.

    (b) Briefly explain a method to detect signals with unknown phase in noise.

(7 + 5 = 12 marks)

Or

14. (a) Derive the likelihood equation of ML estimation.

    (b) Write the difference between Correlation receiver and a Matched filter receiver.

(7 + 5 = 12 marks)

15. State and prove Sampling theorem. (12 marks)

Or

16. (a) With an example, explain quantization in PCM.

    (b) Explain with a block diagram, the working of adaptive delta modulator.

(6 + 6 = 12 marks)

17. What is ISI? What is the reason for ISI? Explain the Nyquist criterion for distortionless base band binary transmission. (12 marks)

Or

18. (a) Explain the following :

    (i) Bit synchronization.

    (ii) Frame synchronization.

    (b) What is eye pattern? Explain.

(8 + 4 = 12 marks)

19. Draw the transmitter, receiver block diagrams of BFSK system. Also write the basis functions, signal constellation points and also draw the signal space diagram. (12 marks)

Or

20. Explain :

    (i) M-asy PSK system.

    (ii) M-asy QAM.

(6 + 6 = 12 marks)

[5 × 12 = 60 marks]

G 426 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Sixth Semester

Branch : Electronics and Communication Engineering

EC 010 606 L06—TELEVISION AND RADAR ENGINEERING (Elective I) [EC]

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*
Each question carries 3 *marks.*

1. Explain the merits of vestigial sideband transmission.
2. Define luminance, hue and saturation.
3. Give the applications of radar.
4. Differentiate A-scope, B-scope and PPI.
5. How does a geostationary satellite system work ?

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Why is interlaced scanning preferred over progressive scanning ?
7. Give the working principle of a precision-in-line colour picture tube.
8. Derive radar range equation.
9. Explain the principle of over the horizon radar.
10. Describe the working of a satellite receiver with the aid of block diagram.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*
Each question carries 12 *marks.*

11. Explain the various components of a composite video signal.

Or

12. With the help of block diagram give the operation of a monochrome receiver system.

Turn over

13. Describe the principle of NTSC coder with its block diagram.

Or

14. Explain the working of PAL-D colour receiver with the aid of block diagram.

15. Describe the working principle of LCD and plasma screen receiver.

Or

16. Explain cable television distribution system with a neat block diagram.

17. Explain two-co-ordinate amplitude comparison monopulser tracking radar.

Or

18. Give the principle of MTI radar and delay line canceller.

19. List the various types of duplexers used in radar with their principles.

Or

20. Give the principle of electronically steered phased array antenna and its applications.

(5 × 12 = 60 marks)

G 482 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Sixth Semester

Branch : Electronics and Communication Engineering

ELECTRONIC INSTRUMENTATION (L)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions briefly.*
Each question carries 4 *marks.*

1. State the three types of systematic errors, giving examples of each.
2. Explain the differences between analog and digital signal.
3. What are the advantages of using a foil type strain gauge ?
4. What are the differences between photoemissive, photoconductive and photovoltaic transducers ?
5. What is frequency modulation telemetry system ?
6. What are the limitations of landline telemetry ?
7. Define the term null as it applies to bridge measurement. What are the advantages of this method ?
8. What are the objectives and requirements of recording data ?
9. List out and explain general features of differential pressure type flow meters.
10. Explain the operation of a pressure switch.

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. Derive the expression for the time response of a second order underdamped system when subjected to unit ramp input. Show that the nature of the response of the system is same as that for a unit step input.

Or

Turn over

12. Explain the following sources of errors :

(i) Noise. (ii) Response time.

(iii) Design limitations. (iv) Energy exchanged by interaction.

(v) Transmission. (vi) Deterioration of measuring system.

(6 × 2 = 12 marks)

13. (a) Explain the operation of a photo-multiplier. (6 marks)

(b) Under what conditions is a dummy strain gauge used ? What are the functions of strain gauges ? (6 marks)

Or

14. (a) With neat diagrams, describe the operation of a piezoelectric transducer. (6 marks)

(b) What are the differences between self generating non-self generating and passive inductive transducers ? Explain. (6 marks)

15. With a neat block schematics, describe a complete telemetry scheme which uses FDM and demultiplexing with PCM/FM modulation.

Or

16. With neat sketches, explain the complete system of a force balance, current telemetry. Compare its performance with RF telemetering system.

17. (a) Explain the measurement of capacitance using low voltage Schering bridge. (6 marks)

(b) What are the limitations of Wheatstone bridge ? Explain how a guarded Wheatstone bridge is used. (6 marks)

Or

18. With a neat block diagram, explain the working of a spectrum analyser. What are its applications ?

19. How does the resistance change with temperature for resistance thermometers ? Which is the best material for such a thermometer ? Compare its properties with two possible materials and describe the characteristics of any *one* of them.

Or

20. Explain the principle of torque measurement. With a block schematics, explain the practical set up for torque measurement.

[5 × 12 = 60 marks]

19. A system is represented by the following equation

$$\frac{d^2y}{dt^2} + 5\frac{dy}{dt} + 4y = r(t).$$

Obtain :

(i) State equation.

(ii) Eigen values.

(iii) State transition matrix.

Or

20. (a) Explain any *one* method of computing state transition matrix. (4 marks)

(b) A discrete time system is represented by the state model :

$$X(k+1) = \begin{bmatrix} 0 & 1 \\ -0.16 & 1 \end{bmatrix} X(k) + \begin{bmatrix} +1 \\ +1 \end{bmatrix} r(k)$$

$$y(k) = [1 \quad 0]\, X(k).$$

Determine the unit step response sequence, given $X(0) = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$.

(8 marks)

[5 × 12 = 60 marks]

G 492

(Pages : 4) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Sixth Semester

Branch : Electronics and Communication Engineering

CONTROL SYSTEMS (L)

(Prior to 2010 Admissions)

[Old Scheme—Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

Graph Sheets and Semi-log sheets may be supplied.

Part A

Answer **all** *questions briefly.*
Each question carries 4 *marks.*

1. Write the force balance equations for an ideal mass, ideal spring and ideal dash pot.
2. Define transfer function. What are the advantages of transfer function approach ?
3. A unity feedback system, is represented as $G(s) = \frac{10}{s(s+1)}$. Determine the dynamic error coefficients and obtain the error signal.
4. Applying Routh's criteria, check for stability of the systems having the characteristic equation $2s^5 + s^4 + s^3 + 2s^2 + s + 2 = 0$.
5. What is gain margin ? Discuss its relevance in the analysis of a control system ?
6. Distinguish between absolute stability and conditional stability.
7. Check for the stability of the system described by the characteristic equation :

   $s^5 + 7s^4 + 3s^3 + 4s^2 + 15s + 4 = 0$.

   How many roots are on the right half s-plane ?
8. Explain the working of a tachogenerator.
9. Find the state transition matrix for a system which has $A = \begin{bmatrix} 0 & 1 \\ -15 & -8 \end{bmatrix}$.
10. What is a compensator ? Discuss the need of the same in control system ?

(10 × 4 = 40 marks)

Turn over

Part B

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. Convert the block diagram to signal Flow Graph and obtain the transfer function using Mason's gain rule. (Fig. 1)

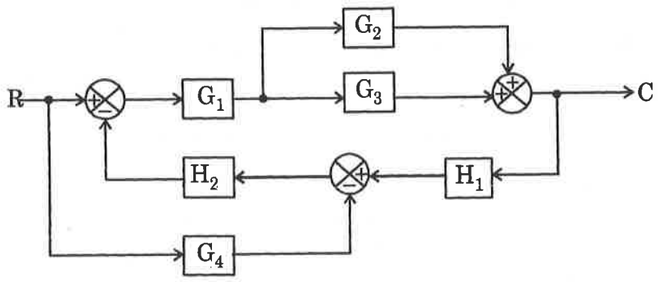
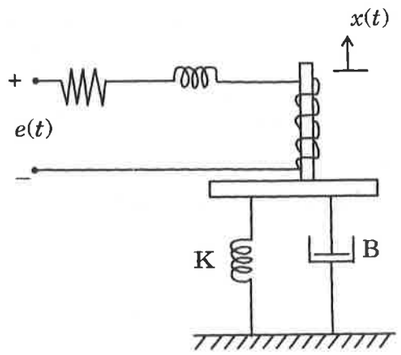


Fig. 1.

Or

12. Determine the transfer function for the system given in Fig. 2.



$e_b(t) = K_b \frac{dx}{dt}$ where

K_b is back e.m.f. constant in v/m/sec.

Fig. 2.

13. A unity feedback system is characterized by the feedback transfer function $G(s) = \frac{K}{s(s+10)}$.

Determine the gain K so that the system will have a damping ratio 0.5. For this value of K, determine the settling time, peak overshoot for a unit step input.

Or

14. (a) Find the range of K for the stability of the system whose characteristic equation is $s^4 + 7s^3 + 14s^2 + 8s + k = 0$. Find the frequency of oscillation when the system is marginally stable.

(8 marks)

(b) For an underdamped second order system subjected to unit step input, derive the expression for 'rise time' with usual notations.

(4 marks)

15. (a) Define and explain the significance of gain margin and phase margin and explain how they can be used to determine the stability of a system ?

(4 marks)

(b) Explain clearly the effect of addition of a pole or zero on stability, with suitable examples.

(8 marks)

Or

16. Obtain Bode plot for the following open loop transfer function and evaluate the gain margin and phase margin :

$$G(s) = \frac{10}{s(1+0.2s)(1+0.02s)}.$$

17. Using step by step procedure, draw the root locus plot for the system having open loop transfer function

$$G(s)H(s) = \frac{K}{s(s+0.5)(s^2+0.5s+10)} \quad 0 < k < \infty.$$

Or

18. A unity feedback control system has an open loop transfer function $G(s) = \frac{K(s+5)}{s(s+2)(s+3)}$. Sketch the approximate root loci for $K \geq 0$. Show that for $K = 8$, the closed loop poles are located at $-4, -0.5 \pm j\,3.12$.

G 472 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Sixth Semester

Branch : Electronics and Communication Engineering

RADIATION AND PROPAGATION (L)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions briefly.*
Each question carries 4 *marks.*

1. Define and explain effective aperture and effective height of an antenna.
2. Explain, with basic equations, the principle of radiation from accelerated charges.
3. Discuss the main features of broadside array and end fire array.
4. Explain Chebyshev arrays.
5. Explain the basic characteristics of microstrip antenna.
6. Explain the working of folded dipole antenna, with the help of its radiation pattern.
7. Distinguish clearly between maximum usable frequency and lowest usable high frequency with reference to ionospheric propagation.
8. Discuss various layers available above the earth's surface and the propagation paths of radiowaves with the help of diagrams.
9. Define beam area with a figure. Show that the total solid angle inside a sphere is equal to 41253 square degrees.
10. Define directivity of an antenna. Give the relation between directivity and antenna efficiency factor.

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. (a) Define and explain the following as referred to antenna :

(i) Radiation pattern. (ii) Radiation intensity.

(iii) Gain. (iv) Beam width.

(4 × 2 = 8 marks)

Turn over

(b) Define isotropic source. Draw and explain its radiation pattern. (4 marks)

Or

12. Derive the expression for maximum effective aperture of an antenna and show that the directivity of an antenna is $D = \frac{4\pi A}{\lambda^2}$, where A is the maximum effective aperture of the antenna.

13. (a) Using the principle of pattern multiplication, show that linear array with binomial amplitude distribution has a pattern with no minor lobes.

(6 marks)

(b) What is an antenna array ? What are the four basic parameters which determine the pattern of an array ?

(6 marks)

Or

14. (a) Draw the radiation pattern for end fire array of $n = 4$, $d = \frac{\lambda}{2}$ m. (6 marks)

(b) Derive the expression for the electric field of two isotropic point sources of equal amplitude and inphase currents. Origin is at the middle of the array.

(6 marks)

15. Explain the following, giving their applications :

(i) Rhombic antenna.

(ii) Yagi-Uda antenna.

(iii) Inverted V antenna.

(3 × 4 = 12 marks)

Or

16. Distinguish between antenna height and effective height of antenna. Explain the effect of ground on antenna performance.

17. (a) What is meant by "critical frequency" and "virtual height" ? (4 marks)

(b) Discuss the regular and irregular variation of the ionosphere. (4 marks)

(c) Discuss the effect of the earth's magnetic field on the ionosphere. (4 marks)

Or

18. (a) Explain the reflection and refraction of electromagnetic waves by ionosphere. (7 marks)

(b) Communication is to be established between two stations 1500 km. apart. Calculate the maximum frequency you may choose for communication using the ionosphere as reflector if the height and the plasma frequency of the ionosphere at the point of reflection are 250 km. and 12 MHz respectively. Assume the ionosphere to be thin and the earth to be flat.

(5 marks)

19. Derive the power radiated by a half-wave dipole and obtain its radiation resistance. Take $\frac{1}{2} \cdot \int_0^{\pi} \left(\frac{1+\cos(\pi\cos\theta)}{\sin\theta} \right) d\theta = 1.219$.

Or

20. (a) Explain beam efficiency and directivity of an antenna. (6 marks)

(b) Show that the impedance of an isolated antenna when used for receiving is the same as when used for transmitting.

(6 marks)

[5 × 12 = 60 marks]

G 463 **(Pages : 3)** **Reg. No.....**

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Sixth Semester

Branch : Electronics and Communication Engineering/Information Technology/Applied Electronics and Instrumentation/Electronics and Instrumentation

DIGITAL SIGNAL PROCESSING (L,T,A,S)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions briefly.*
Each question carries 4 *marks.*

1. Explain the impulse invariance method of transforming analog filter to digital filter.

2. Draw the cascade realization of the system function $H(z)=\left(1+\frac{1}{2}z^{-1}+z^{-2}\right)\left(1+\frac{1}{4}z^{-1}+z^{-2}\right)$.

3. What are the conditions for the impulse response of FIR filter to satisfy for constant group and phase delay and for only constant group delay ?

4. What is a Hann window function ? Obtain its frequency domain characteristics ?

5. What are the advantages of FFT algorithm when compared to direct computation of DFT ?

6. Explain the method of overlap-add to obtain linear convolution of a finite and infinite sequence.

7. Explain zero input limit cycle oscillations ?

8. Compare fixed point and floating point arithmetic.

9. What are the different methods of speech coding ? Explain briefly.

10. What is a homomorphic vecoder ? Explain with a block diagram ?

(10 × 4 = 40 marks)

Part B

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. (a) Obtain the cascade form realization for the system $H(z)=\frac{1+\left(\frac{3}{4}\right)z^{-1}+\left(\frac{1}{8}\right)z^{-2}}{1-\frac{5}{8}z^{-1}+\frac{1}{16}z^{-2}}$.

(b) Obtain the parallel form structure of a digital filter $H(z) = \dfrac{\left(1 - \frac{1}{2} z^{-1}\right)}{\left(1 - \frac{1}{4} z^{-1}\right)\left(1 - \frac{1}{5} z^{-1}\right)}$.

Or

12. Design a digital Butterworth filter to meet the following constraint :

$$\frac{1}{\sqrt{2}} \leq |H(w)| \leq 1 \text{ for } 0 \leq w \leq \pi/5 .$$

$$0 \leq |H(w)| \leq 0.1 \text{ for } \pi/2 \leq w \leq \pi .$$

13. Design a high-pass filter using Hamming window, with a cut-off frequency of 1.2 radians/sec and N = 9.

Or

14. Consider an FIR lattice filter with coefficients $k_1 = \frac{1}{2}, k_2 = \frac{1}{3}, k_3 = \frac{1}{4}$. Determine the FIR filter coefficient for the direct form structure.

15. Compute the 8-point DFT of the sequence $x(n) = \begin{cases} 1, & 0 \leq n \leq 7 \\ 0, & \text{otherwise} \end{cases}$ using DIT and DIF algorithms.

Or

16. (a) Find the circular convolution of 2 sequences $x_1(n) = \{2, \underset{\uparrow}{1}, 2, 1\}$, $x_2(n) = \{1, 2, 3, 4\}$.

(6 marks)

(b) Consider the following 8 point sequences defined for $0 \leq n \leq 7$. Which of these sequences have a real valued 8 point DFT ?

(i) $x_1(n) = \{1, 2, 3, -1, 0, -1, 3, 2\}$.

(ii) $x_2(n) = \{0, 2, 3, 4, 0, -4, -3, -2\}$.

(6 marks)

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

(i) Calculate the response to the input $x(n) = \left(\frac{1}{4}\right)^n u(n)$ assuming infinite precision arithmetic.

(ii) Calculate the response $y(n), 0 \leq n \leq 5$ to the same input assuming finite precision with 5 bits, one sign bit plus four fractional bits. The quantization is performed by truncation. Discuss the results.

Or

18. (a) For the system with system function $H(z) = \dfrac{1 + 0.75 z^{-1}}{1 - 0.04 z^{-1}}$, draw the signal flow graph and find scale factor S_0 to avoid overflow in the input adder.

(8 marks)

(b) Write a note on finite word length effects in digital filters. (4 marks)

19. Describe channel vocoder in two separate blocks : (a) channel vocoder analyser ; (b) channel vocoder synthesizer.

Or

20 Explain with the help of block diagram, the radar system and signal processing in the radar system.

[5 × 12 = 60 marks]

G 453

(Pages : 3)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Sixth Semester

Branch : Electronics and Communication Engineering

DIGITAL COMMUNICATION TECHNIQUES (L)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer **all** *questions briefly.*
Each question carries 4 *marks.*

1. With suitable examples, explain random variable and random process.
2. Explain what do you mean by stationarity and ergodicity with respect to random process ?
3. With neat diagram, give the significance of eye pattern.
4. For the binary 01101001, draw the following coding schemes :
   (a) ON-OFF keying.
   (b) Bipolar signaling.
   (c) Manchester code.
   (d) Non-return to zero signaling.
5. For the binary data 10010011, represent the DISK version. Assume $d_{-1} = 0$.
6. Differentiate between QPSK and MSK signaling schemes.
7. Find the output signal-to-noise ratio in delta modulated system for a 1kHz sinusoid, which is sampled without slope overload ? The bandwidth of the reconstruction filter used in 4kHz.
8. What do you mean by quantization and quantization error ? Explain.
9. Explain the concept of maximum likelihood estimation ? Where it is used ?
10. A binary data is transmitted using ASK over an AWGN channel at a rate 2.4 MBPS. The carrier amplitude at the receiver is 1 mV. Noise power spectral density is $\frac{N_o}{2} = 10^{-15}$ W/Hz. Find the average probability of error. Take *erfc* (5) = 3×10^{-6}.

(10 × 4 = 40 marks)

Turn over

Part B

Answer **all** *questions.*
Each full question carries 12 *marks.*

11. Explain clearly Nyquist's criterion for distortionless base band transmission.

Or

12. (a) A function is expressed as $f(x) = \begin{cases} c(x^2+1) & 1 < x < 3 \\ 0 & \text{elsewhere} \end{cases}$

(i) Find the value of c for $f(x)$ to be a density function.

(ii) Find the probability that x lies between 1 and 2.

(b) Define joint distribution function. Explain its various properties. (5 marks)

13. (a) Discuss the merits and demerits of duobinary signalling.

(b) Show how duobinary decoding is done when the input $\{D(K)\} = \{010101.....\}$ is

(i) Precoded ; (ii) not precoded.

(ii) Show in each case what happens if the fourth bit detected wrongly. (7 marks)

Or

14. (a) Explain adaptive equalisation with a neat block diagram. (6 marks)

(b) Differentiate scambling and descrambling. (6 marks)

15. Draw the block diagram of coherent M-ary FSK transmitter and receiver and also explain in detail the signal space diagram.

Or

16. With neat diagrams explain :

(a) Coherent MSK transmitter and receiver.

(b) Coherent QPSK transmitter and receiver. Also draw the corresponding waveforms.

17. (a) What is quantization ? Explain with neat waveforms, two types of quantization.

(b) Draw the block diagram showing the basic elements of PCM system and explain the importance of each element in the system.

Or

18. A delta modulation system is designed to operate at 3 times the Nyquist rate for a signal with 3 kHz bandwidth. The quantizing step size is 250 mV.

(i) Determine the maximum amplitude of a 1kHz input sinusoidal for which the delta modulator does not show slope overload.

(ii) Determine the post filtered output SNR for the signal of (i)

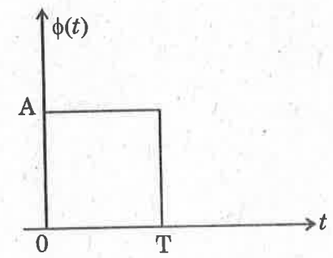
19. Draw and explain the block diagram of a correlation receiver. Derive an expression for the response of the bank of correlation receiver to noisy input.

Or

20. The figure below shows a finite energy signal $\phi(t)$:

(i) Sketch the impulse response $h_{opt}^{(t)}$ of optimum filter matched to $\phi(t)$.

(ii) Determine the value of the output of matched filter at $t = T$ assuming noise is zero and input is $\phi(t)$.



(5 × 12 = 60 marks)

G 424 **(Pages : 3)** **Reg. No.....**

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Sixth Semester

Branch : Electronics and Communication Engineering

EC 010 606 L04 – MEDICAL ELECTRONICS (Elective) (EC)

(New Scheme – 2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

1. Name important parts of human circulatory system.
2. What is phonocardiography?
3. Explain the role of a pre-amplifier in a biomedical recording system.
4. What is input guarding? Explain.
5. Discuss how imaging methods helps in diagnosis and treatment of different diseases.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. Explain the characteristics of Ag-AgCl electrodes.
7. Describe the need and use of cardiac pacemakers.
8. What is telemetry? How it is employed in biomedical field?
9. Explain the operation of a Ventillator.
10. Describe the basic principle of ultra sound imaging.

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*

Each full question carries 12 *marks.*

11. (a) Sketch the waveform corresponding to the action of a muscle cell and explain its shape corresponding to the action of the cell.

(b) Explain the working of EMG electrodes with neat sketches.

(6 + 6 = 12 marks)

Or

12. (a) Explain the need of jellies and creams with electrodes to measure the bio-electric potential.

(b) Describe the working of different transducers used for the measurement of body temperature.

(4 + 8 = 12 marks)

13. (a) What is the normal value of BP in a healthy human being. Explain the state of hypo and hypertension.

(b) Describe the direct method of BP measurement.

(4 + 8 = 12 marks)

Or

14. (a) Explain the concept of Einthoven triangle in ECG measurement.

(b) Describe the following methods used for the measurement of cardiac output :

(i) Dye dilution method.

(ii) Indicator dilution method.

(4 + 8 = 12 marks)

15. Explain the following :

(a) EEG frequency bands.

(b) EEG electrodes.

(c) EEG recorder.

(12 marks)

Or

16. Describe the following in detail :

(a) Bed side monitoring system.

(b) Cardiac tachometer.

(12 marks)

17. (a) Explain the principle and working of electromagnetic blood flow meter.

(b) Describe the working of laser doppler blood flow meter with neat block diagram.

(6 + 6 = 12 marks)

Or

18. (a) With block diagram, explain the optical method of blood cell counting.

(b) Describe the method of measurement of pH value of blood.

(8 + 4 = 12 marks)

19. (a) Describe the basic principle of C.T.

(b) Name the four sub systems in a CT system and explain each one in detail.

(4 + 8 = 12 marks)

Or

20. (a) With block diagram, explain a pulse-echo system used in medical ultrasound equipments.

(b) Explain the following :

(i) Multi-element linear array scanners.

(ii) Phased array scanners.

[5 × 12 = 60 marks]

G 361

(Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Sixth Semester

Branches : Applied Electronics and Instrumentation/Electronics and Communication/ Electronics and Instrumentation Engineering

AI 010 602/EC 010 602/EI 010 602—DIGITAL SIGNAL PROCESSING (AI, EC, EI)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

Answer **all** *questions briefly.*
Each question carries 3 *marks.*

1. Determine if the system $y(n) = e^{x(n)}$ is time invariant or not ?

2. Find the transfer function description of the system difference equation $y(n) = x(n) - b_1 y(n-1) - b_2 y(n-2)$, where $x(n)$ is input and $y(n)$ is the output.

3. Draw the frequency response characteristics for the ideal low-pass, band-pass and high-pass filters.

4. Write the equations specifying Barlett and Hamming windows.

5. Obtain the linear convolution of the sequences $x(n) = \{1, 2, 3\}$, $h(n) = \{-1, -2\}$ using circular convolution.

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*
Each question carries 5 *marks.*

6. Find the z-transform of $x(n) = n2^n \sin\left(\frac{\pi}{2} n\right) u(n)$.

7. Solve the difference equation, where input sequence is $x(n) = 3^{n-2}$, $n \geq 0$, using z-transform, where $2y(n-2) - 3y(n-1) + y(n) = x(n)$ with the initial conditions : $y(-2) = \frac{-4}{9}$, $y(-1) = -\frac{1}{3}$.

8. Draw the cascade and parallel form realisations of $\frac{(4s + 28)}{(s+1)(s+5)}$.

Turn over

9. In a band-pass filter, the desired frequency response is :

$$H_d\left(e^{jw}\right) = \begin{cases} e^{-jw\tau} & , \ w_{c_1} \le |w| \le w_{c_2} < \pi \\ 0 & , \ \text{otherwise} \end{cases}$$

Obtain the filter coefficients for a rectangular window for

$N = 7, w_{c_1} = 1$ rad/s, $w_{c_2} = 2$ rad/s, $\tau = \dfrac{(N-1)}{\cdot 2}$.

10. Compute the DFT of the sequence whose values for one period is given by $\tilde{x}(n) = \{1, 1, -2, -2\}$.

(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*

Each question carries 12 *marks.*

11. Calculate the frequency response for the LTI system representation below :

(a) $h(n) = \left(\dfrac{1}{2}\right)^n u(n)$.

(b) $h(n) = \delta(n) - \delta(n-1)$.

(c) $h(n) = (0.9)^n \left(e^{j\pi/2}\right)^n u(n)$.

Or

12. A causal LTI system is described by the difference equation $y(n) - ay(n-1) = bx(n) + x(n-1)$ where 'a' is real and less than 1 in magnitude. Find a value of 'b' $(a \neq b)$ such that the frequency response of the system satisfies $\left|H\left(e^{jw}\right)\right| = 1$ for all w.

13. For the LSIV system $H(s) = \dfrac{z - a^{-1}}{z - a}$, where '$a$' is real.

(a) For what range of values of 'a' is the system stable ?

(b) If $0 < a < 1$, plot the pole-zero diagram and shade the ROC.

(c) Show graphically in the z-plane that this system is an all pass system.

Or

14. Find $H(z)$, and the frequency response of $h(n) = \left(\dfrac{1}{2}\right)\left[\left(\dfrac{1}{2}\right)^n + \left(\dfrac{-1}{4}\right)^n\right] u(n)$ substituting $z = e^{jw}$.

Locate the zeros and poles in the z-plane.

15. (a) Determine the direct form realisation of the system function

$$H(z) = 1 + 2z^{-1} - 3z^{-2} - 4z^{-3} + 5z^{-4}.$$

(b) Obtain the cascade realisation of the system function $H(z) = 1 + \dfrac{5}{2} z^{-1} + 2z^{-2} + 2z^{-3}$.

Or

16. Design an ideal low-pass filter with frequency response

$$H_d\left(e^{jw}\right) = 1 \quad \text{for} \quad -\frac{\pi}{2} \le w \le \frac{\pi}{2}$$

$$= 0 \quad \text{for} \quad \frac{\pi}{2} \le |w| \le \pi.$$

Find the values of $h(n)$ for N = 11.

17. Design a filter with $H_d\left(e^{-jw}\right) = e^{-j3w}$, $\dfrac{-\pi}{4} \le w \le \dfrac{\pi}{4}$

$$= 0 \ , \quad \frac{\pi}{4} < |w| \le \pi.$$

Use Hanning window with N = 7.

Or

18. Using Bilinear Transformation design a digital band-pass Butterworth filter with the following specifications :

Sampling frequency $f = 8$ kHz

$\alpha_p = 2$ dB in the pass-band 800 Hz $\le f \le 1000$ Hz

$\alpha_s = 20$ dB in the stopband, $0 \le f \le 400$ Hz and $2000 \le f \le \infty$.

19. Find the output of $y(n)$ of a filter whose impulse response in $h(n) = \{1, 1, 1\}$ and input signal $x(n) = \{3, -1, 0, 1, 3, 2, 0, 1, 2, 1\}$ using (a) overlap-save method ; and (b) overlap-add method.

Or

20. Find the DFT of a sequence $x(n) = \{1, 2, 3, 4, 4, 3, 2, 1\}$ using DIT algorithm.

(5 × 12 = 60 marks)