G 5060 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Electronics and Communication Engineering

RADIATION AND PROPAGATION (L)

(Improvement/Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Derive an expression for radiation resistance of a current element.
2. What is Practical elementary dipole ? Derive an expression for the radiation resistance of a short dipole and monopole of length $l/2$.
3. Explain the principle of pattern multiplication.
4. What is a linear array ? Derive an expression for the amplitude of first secondary lobe of a uniform linear array.
5. Explain the principle of radiation of a V antenna.
6. With neat diagrams explain the directional properties of a dipole antennas.
7. Define critical frequency and virtual heights with expressions.
8. Derive an expression for radio horizon in case of space wave propagation.
9. A person with a receiver is 5 km away from the transmitter. What is the distance that this person must move further to detect a 3dB decrease in field strength ?
10. A short vertical grounded antenna is designed to radiate at 1MHz. Calculate the radiation resistance, if the effective height of the antenna is 30 meters.

(10 × 4 = 40 marks)

Part B

Answer any **one** *full questions from each module.*
Each full question carries 12 *marks.*

MODULE 1

11. Derive the relationship between maximum effective aperature A_{em} and directivity. Show that A_{em} of $\lambda/2$ dipole is $0.13\lambda^2$.

Or

12. Explain the scattering aperture and derive expression for it, for matched, resonant, short circuit and open circuit load impedances.

Turn over

MODULE 2

13. (a) Derive expression for total electric field in case of a linear uniform array of n-isotropic point sources.

(7 marks)

(b) Explain the field pattern and power pattern for an antenna. Show HPBW and BWFN on the curves.

(5 marks)

Or

14. With appropriate analysis, draw the unit circle diagram and sketch the radiation pattern of a 4-element end-fire array having an element spacing of one-quarter wavelength and progressive phase shift of $-\pi/2$ radiations.

MODULE 3

15. Draw a neat sketch of 3-element YAGI-UD antenna array. Derive an expression for the gain of the same.

Or

16. (a) With neat sketches, explain travelling wave antenna. (6 marks)

(b) Describe the constructional features and applications of inverted V antenna. (6 marks)

MODULE 4

17. (a) What is surface wave tilt in surface wave propagation ? Derive an expression for the tilt angle.

(8 marks)

(b) Explain normal refractions that occur in troposphere for the EM wave. (4 marks)

Or

18. Explain how the ionosphere effects radio waves. Hence deduce the critical frequency of a reflecting layer in terms of its ionization density. Discuss the effects of earth's magnetic field on ionospheric reflections.

MODULE 5

19. (a) Explain beam efficiency and directivity for an antenna. (6 marks)

(b) Determine the radiated power and radiation resistance of a quarter-wave monopole antenna given that the maximum effective current through the antenna is 0.1 Amps, under maximum efficiency.

(6 marks)

Or

20. (a) Explain mutual impedance between antennas. Show that the input impedance and output impedance are dependent on current ratio.

(6 marks)

(b) Derive an expression for antenna impedance using reciprocity theorem. (6 marks)

[5 × 12 = 60 marks]

G 5070 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Electronics and Communication Engineering

ELECTRONIC INSTRUMENTATION (L)

(Improvement/Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Define accuracy and precision in measurements and explain them with suitable examples.
2. Define and explain the calibration error and random error.
3. Distinguish between passive and active transducers with help of examples.
4. Explain briefly the working of linear potentiometer as a passive transducer ? What are its applications ?
5. Compare the advantages of analog and digital techniques in telecontrol installations.
6. What are the essential properties required for an instrumentation amplifier ?
7. Explain what is the condition to get maximum sensitivity for a Wheatstone bridge ?
8. Discuss the various applications of spectrum analyzer.
9. What do you mean by pressure ? What are the methods available for medium pressure measurement ?
10. Explain the working of a thermistor used in temperature measurement.

(10 × 4 = 40 marks)

Part B

Answer any **one** *full question from each module.*
Each full question carries 12 *marks.*

Module 1

11. Clearly define any six types of errors in measurement. What are the causes ? How can they be minimised ?

Or

12. Distinguish between static and dynamic characteristics. With the help of suitable examples, explain resolution, hysteresis, sensitivity, drift and linearily.

Turn over

MODULE 2

13. Explain the following parameters of transducer :—

(i) transfer function

(ii) hysteresis

(iii) type of input and operating range.

(3 × 4 = 12 marks)

Or

14. Explain the principle and working and applications of the following types of transducers :—

(a) photo voltaic

(b) photo emissive

(c) piezoelectric.

(3 × 4 = 12 marks)

MODULE 3

15. (a) Define and explain "telemetry", "data transmission". (4 marks)

(b) What is "current telemetry" ? What are its merits and demerits ? (4 marks)

(c) What are the factors considered to improve the signal-to-noise ratio of RF telemetry system ? (4 marks)

Or

16. Describe how telemetering systems are classified ? Explain the performance of each type and give their applications.

MODULE 4

17. With neat circuit, explain schering bridge. Derive the equation and show how capacitance is measured using the same.

Or

18. With neat diagrams, describe the principle of working of a distortion analyser ?

MODULE 5

19. With the help of diagrams, explain any two different types of strain gauges and their working and applications.

Or

20. What is multiplexing ? Describe the techniques of any two types of multiplexing and their applications.

[5 × 12 = 60 marks]

G 5394 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Electronics and Communication Engineering

EC 010 601—DIGITAL COMMUNICATION TECHNIQUES (EC)

(New Scheme—Regular)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Write the properties of Gaussian process.
2. Briefly explain a matched filter receiver.
3. What is aliasing effect ? Explain.
4. Briefly explain the duobinary signalling method for digital transmission.
5. Compare the performance of BFSK and BPSK.

(5 × 3 = 15 marks)

Part B

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

6. Explain the following terms :
   (a) Random process.
   (b) Stationariy and its different types.
   (c) Ergodicity.
7. Explain ML detector.
8. Compare and contrast between PAM, PWM and PPM.
9. What is eye pattern ? What are the informations obtained from eye pattern ?
10. Explain MPSK system.

(5 × 5 = 25 marks)

Part C

Each question carries 12 *marks.*

11. Derive the relation between input P.S.D. and output P.S.D. when a stationary random process is passed through a LTI system.

(12 marks)

Or

12. (a) What is Wiener-Khintchine-Einstein theorem ? Derive the relationship. (8 marks)

(b) What is White process ? Derive the P.S.D. of White Process. (4 marks)

13. (a) Draw the block diagram and explain the operation of a correlation receiver. (8 marks)

(b) What is error function ? Explain. (4 marks)

Or

14. Explain with an example, the detection of signals with unknown phase in noise. Also derive the error probability. (12 marks)

15. With a neat block diagram, explain the operation of DPCM transmitter and receiver. (12 marks)

Or

16. (a) Explain the different quantization noises associated with delta modulation. (7 marks)

(b) What is sampling ? Explain the different types. (5 marks)

17. (a) What is ISI ? How it occurs ? Explain the ideal solution to overcome it. (8 marks)

(b) With an example explain the following :

(i) NRZ Coding.

(ii) Manchester Coding. (4 marks)

Or

18. (a) Explain about bit synchronization and frame synchronization. (8 marks)

(b) What is equalization ? Explain. (4 marks)

19. Draw the block diagrams and explain the operation of a BFSK transmitter and receiver. Also write the basis function, signal constellation points, and draw the signal space diagram. (12 marks)

Or

20. (a) What is minimum shift keying modulation ? Explain. (8 marks)

(b) Briefly explain about Trellis Coded modulations. (4 marks)

[5 × 12 = 60 marks]

G 5412 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Electronics and Communication Engineering

EC 010 603—RADIATION AND PROPAGATION (EC)

(New Scheme—Regular)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. Explain what is an Isotropic point source.
2. Show the effect of varying antenna spacing parameters on pattern of array.
3. Write short notes on smart antennas.
4. Explain critical frequency.
5. How will you measure impedance of an antenna ?

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. What are the different antenna field zones ? Explain them in detail.
7. Explain the features of Dolph Tchebyscheff array.
8. What are the various configurations of microstrip antenna ? Sketch them.
9. Explain what is ionospheric propagation.
10. How will you measure the impedance of an antenna ?

(5 × 5 = 25 marks)

Part C

Each question carries 12 *marks.*

11. Explain how power is radiated from a current element.

Or

12. Distinguish between effective aperture and effective height of an antenna. Explain their importance.

Turn over

13. Explain the principle of radiation from a 2 element antenna array. Derive an expression for antenna array factor.

Or

14. Draw a neat sketch of binomial array. Explain its principle of operation. State the advantages and applications of binomial array.

15. Differentiate folded dipole antenna from simple dipole element. Prove that input impedance of folded dipole is higher than the simple dipole element.

Or

16. Write technical notes on :

    (i) Cassergrain antenna.

    (ii) Rhombic antenna.

17. Describe the factors involved in the propagation of radio waves.

Or

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

19. How will you measure the gain of an antenna ?

Or

20. How will you measure the efficiency of an antenna ?

(5 × 12 = 60 marks)

G 5423 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Electronics and Communication Engineering

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

(New Scheme—Regular)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 marks.

1. What is Instruction sequencing ?
2. Explain Multibus organisation.
3. Discuss the memory characteristics.
4. What is Pipelining ?
5. What is USB ?

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. Explain the functions of Linker and Loader.
7. Explain Array multiplier.
8. What are the different types of buses ?
9. What are Multicomputer systems ?
10. Discuss about optical storage.

(5 × 5 = 25 marks)

Part C

Each full question carries 12 *marks.*

11. (a) Discuss the differences between Architecture, Organisation and Hardware. (6 marks)

    (b) What are Addressing Modes ? (3 marks)

    (c) Explain shared program concept. (3 marks)

Or

12. (a) Explain the factors that are used to evaluate the CPU performance. (6 marks)

    (b) Explain Super Scalar architecture. (6 marks)

Turn over

13. Explain the different types of Division techniques. (12 marks)

Or

14. Explain Hardwired control unit and Microprogrammed control unit briefly. (12 marks)

15. Explain the different secondary memories in detail. (12 marks)

Or

16. (a) Explain :

(i) Virtual memory.

(ii) MMU.

(iii) Replacement algorithm.

(8 marks)

(b) Compare Static RAM and Dynamic RAM. (4 marks)

17. (a) Explain the concept of pipelining and how it leads to enhanced performance. (6 marks)

(b) Discuss the hazards in pipelining. (6 marks)

Or

18. (a) Explain multithreading. (4 marks)

(b) Explain Message passing architecture. (8 marks)

19. Explain the different Hardware units on a P.C. (12 marks)

Or

20. (a) Explain SMPS and its functions. (6 marks)

(b) Draw the block diagram of a common PC and explain. (6 marks)

[5 × 12 = 60 marks]

G 5435 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Electronics and Communication Engineering

EC 010 605—MICROCONTROLLERS AND APPLICATIONS (EC)

(New Scheme—Regular)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Compare Microprocessors and Microcontrollers.
2. Explain the following Instructions :—
   (a) MOVX A, @ DPTR ;
   (b) MOV A, @R0 ;
   (c) MOV A, #08.
3. Write an ALP for generating a triangular waveform of frequency 30MHz.
4. Name the different types of ADC and DAC interfacings.
5. Write short notes on PIC instruction format.

(5 × 3 = 15 marks)

Part B

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

6. Distinguish between Harvard and von-Neumann architecture.
7. Sketch and explain the function of Programming status word of 8051.
8. Discuss the serial data transfer concept of 8051 μC.
9. Write an ALP to count the number of key press in the computer and display the count.
10. Explain with an example the pipelining concept of PIC 18 microcontroller.

(5 × 5 = 25 marks)

Part C

Answer any **one** *question from each module.*
Each question carries 12 *marks.*

11. Draw the pin 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 addressing modes supported by 8051μC.

Or

14. Write a program for the adding 'N' 8-bit numbers using 8051μC.

15. With an application, explain the different modes of TIMER used in 8051μC.

Or

16. What are the interrupts available in the 8051 ? Explain them in detail.

17. Draw and explain the LED interfacing with 8051, also write an ALP for displaying the word "HAI" twice.

Or

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

19. Discuss the different types of instruction set available in PIC 18μC.

Or

20. With an example to each explain the addressing modes of PIC 18μC.

(5 × 12 = 60 marks)

G 5461 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Electronics and Communication Engineering

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

(New Scheme – Regular)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. Name different parts of a cardiovascular system.
2. Define Cardiac rate and Cardiac output.
3. List the different frequency bands of EEG related to the state of a human being.
4. Explain the role of instrumentation amplifier in biomedical instruments.
5. Discuss hazards in using X-rays and CT in humans.

(5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. Discuss the selection criteria of surface electrodes for medical applications.
7. What is Ballisto cardiography? Explain.
8. Describe the working of cardiac tachometer.
9. Explain the measurement method of pH value of blood.
10. Describe the basic principle of CT.

(5 × 5 = 25 marks)

Part C

Each question carries 12 *marks.*

11. (a) Define action and resting potential of human cell. With diagram, explain the electrical activity associated with muscle action. Sketch the wave shape.

    (b) What type of transducer is used in a stethescope. Explain its operation.

(6 + 6 = 12 marks)

Or

Turn over

12. (a) With neat sketches, explain different types of electrodes used for ECG measurement.

(b) Sketch an ECG waveform, and explain its shape and different parts in association with cardiac cycle.

(8 + 4 = 12 marks)

13. (a) Explain the operation of sphygmomanometer.

(b) Describe the limb electrodes and chest electrodes used in ECG measurement. Explain ECG measurement in both case.

(4 + 8 = 12 marks)

Or

14. (a) Describe the thermal dilution method used to measure cardiac output.

(b) Explain the working of the following :

(i) D.C. defibrillator.

(ii) A.C. defibrillator.

(6 + 6 = 12 marks)

15. Explain the following :

(a) EMG Electrodes.

(b) EMG Recorder.

(2 × 6 = 12 marks)

Or

16. With block diagram, explain a single channel telemetry system.

(12 marks)

17. (a) Explain the principle of ultrasonic doppler shift blood flow meter and explain its operation with block diagram.

(b) Sketch the arrangement used for measuring the arterial blood flow using NMR method. Explain its operation.

(6 + 6 = 12 marks)

Or

18. (a) With block diagram, explain the principle and working of Coulter Counter.

(b) Name different respiratory transducers and briefly explain its working.

(6 + 6 = 12 marks)

19. (a) Explain the role of collimators and grids in an X-ray tube.

(b) Describe the automatic dose control in an x-ray image intensifier system.

(4 + 8 = 12 marks)

Or

20. (a) Compare the advantages and applications of X-ray and ultrasound scanning systems.

(b) Explain the following :

(i) Patient safety.

(ii) Radiation hazards.

(4 + 8 = 12 marks)

[5 × 12 = 60 marks]

G 5463 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Electronics and Communication Engineering

EC 010 606 L06 – TELEVISION AND RADAR ENGINEERING (Elective I) (EC)

(New Scheme – Regular)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Why audio signals are frequency modulated and video signals are amplitude modulated in T.V. Transmission? Explain.
2. Write the characteristics of PAL system.
3. Explain about cable decoders.
4. What is doppler effect? Explain.
5. What is the need for duplexer in radar? Explain.

(5 × 3 = 15 marks)

Part B

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

6. What is interlaced scanning? Also explain the need of interlaced scanning.
7. Explain the working principle of colour TV camera.
8. Explain about a geostationary satellite.
9. Make a comparison of different trackers.
10. What are Radomes? Explain.

(5 × 5 = 25 marks)

Part C

Answer only **one** *question from each module.*
Each question carries 12 *marks.*

MODULE 1

11. (a) What is V.S.B. transmission? Also write the advantages and disadvantages.
    (b) What is the need of synchronizing pulses in video signal transmission.

(8 + 4 = 12 marks)

Or

Turn over

12. What is a composite video signal? Also explain how the horizontal retrace period and vertical retrace period is effectively utilized in 625 line system.

(12 marks)

MODULE 2

13. With a block diagram, explain the working of PAL decoder.

(12 marks)

Or

14. (a) Explain the generation of chrominance signal in T.V.

(b) Write the working principle of colour killer circuit in PAL decoder.

(7 + 5 = 12 marks)

MODULE 3

15. Give a detailed account on composite digital standard and 4 Fsc NTSC standard.

(12 marks)

Or

16. (a) With a neat diagram, explain about cable distribution system.

(b) Write a short note on EDTV.

(8 + 4 = 12 marks)

MODULE 4

17. (a) Explain about FM-CW radar.

(b) Write down the working principle of delay line canceller.

(6 + 6 = 12 marks)

Or

18. With a neat diagram, explain the working of I-D phase comparison monopulse tracking radar.

(12 marks)

MODULE 5

19. Give a detailed account on different radar antennas. Also write the down the advantages and disadvantages.

(12 marks)

Or

20. Explain about :

(a) Synthetic aperture radar.

(b) 3 D Radar.

(c) Radar beacons.

(4 + 4 + 4 = 12 marks)

[5 × 12 = 60 marks]

G 5031 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Electronics and Communication/Applied Electronics and Instrumentation/Electronics and Instrumentation

INDUSTRIAL MANAGEMENT AND ECONOMICS (LAS)

(Improvement/Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Answer Section I and Section II in **separate** *answer books.*

Section I (Industrial Management)

PART A

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

1. Define two factor theory of motivation.
2. What are the objectives of control function ?
3. Differentiate between recruitment and selection. List the methods used ?
4. What is Proprietor ship ? What are its functions and responsibilities ?
5. What are the purposes for organizations to hold inventory ? Explain.
6. What is a dummy activity ? What purpose is served by including dummy activities in a network analysis ?

(6 × 4 = 24 marks)

PART B

Answer any **one** *full questions from each module.*
Each full question carries 12 *marks.*

MODULE 1

7. What do you mean by line and staff type of organizational structure ? What are the roles of line numbers and staff members ?

Or

8. (a) Define planning and discuss its importance.

   (b) List and explain the principles of directing.

Turn over

MODULE 2

9. (a) Explain the role of Trade union in the smooth working of an industry.

   (b) Explain quality circle and benefits of quality circle.

Or

10. (a) Explain the features and types of co-operative organisation. Bring out its merits and demerits.

    (b) Discuss the importance of operator training in industry. Explain any one training method in detail.

MODULE 3

11. (a) What are the different steps in marketing research ? What are its functions ?

    (b) What do you mean by network analysis ? What are its different stages ?

Or

12. (a) What are the 4P's of marketing ? Explain their importance.

    (b) Explain different steps involved in advertising process.

(3 × 12 = 36 marks)

Section II (Economics)

PART A

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

1. Explain elasticity of demand.
2. Distinguish between direct and indirect taxes.
3. Describe the credit control measures imposed by RBI on Commercial Banks.
4. Explain the functions of IRBI.

(4 × 4 = 16 marks)

PART B

Answer any **one** *full questions from each module.*
Each full question carries 12 *marks.*

MODULE 4

5. (a) Define capital. Explain the basic methods of capital formation.

   (b) State law of demand ? Distinguish between total demand and market segmented demand.

Or

6. (a) Explain progressive, proportional and regressive taxes.

   (b) Suggest methods to control black money in Indian economy.

MODULE 5

7. (a) Explain the important functions of commercial banks.

   (b) What are the important characteristics of stock markets in India ?

Or

8. (a) Explain the role of multinational and transnational corporations in Indian Economy.

   (b) Describe the development of NABARD. What are its functions ?

(2 × 12 = 24 marks)

G 5041 (Pages : 3) **Reg. No.....**

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Electronics and Communication Engineering

DIGITAL COMMUNICATION TECHNIQUES (L)

(Improvement / Supplementary / Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Explain mean and variance of a random variable.
2. With a neat diagram, explain the Gaussian probability density function.
3. Explain the Manchester format for base band binary data representation.
4. Why ISI is caused ? Give methods to overcome the same.
5. Given the binary data 001100101111, represent in FSK and PSK.
6. Draw and comment on the geometrical representation of BPSK signal.
7. What are the demerits of delta modulation ? Explain how these are overcome in adaptive delta modulation ?
8. What is companding ? Explain.
9. List the properties of matched filter.
10. Derive the expression for the probability error of BFSK.

(10 × 4 = 40 marks)

Part B

Answer any **one** *full question from each module.*
Each full question carries 12 *marks.*

MODULE 1

11. A band pass signal with a spectrum shown in Fig. 1 is ideally sampled. Sketch the spectrum of the sampled signal when

    (a) f_s = 20 Hz. (b) f_s = 30 Hz.

    (c) 40 Hz.

Turn over

Indicate if and how the signal can be recovered ?

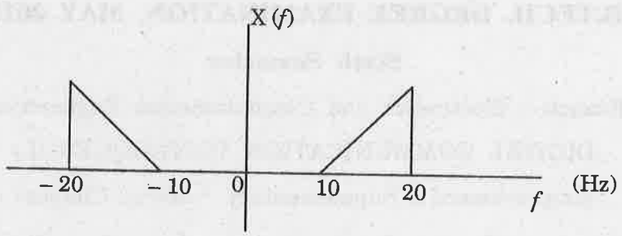

Fig. 1

Or

12. Discuss in detail the baseband transmission of binary data and ISI problems. Suggest the solutions.

MODULE 2

13. (a) With the help of a neat block diagram explain the operation of Duobinary signalling ?

(6 marks)

(b) The binary data 101100101 is applied to the input of a duobinary system.

(i) Construct the duobinary coder output ; and

(ii) Corresponding receiver output.

(6 marks)

Or

14. (a) What is adaptive equalization ? Explain the operation of an adaptive equalizer with the help of neat block diagram ?

(6 marks)

(b) Explain the significance of "eye pattern" in the signal detection process ? (6 marks)

MODULE 3

15. (a) Explain the operation of coherent QPSK system with the help of signal-space diagram.

(6 marks)

(b) Explain the operation of a coherent Binary PSK transmitter and receiver. (6 marks)

Or

16. An FSK system transmitts binary data at a rate of 2.5×10^6 bits per second during transmission, while Gaussian noise of zero mean and psd 10^{-20} W/Hz is added to the signal. In the absence of noise, the amplitude of the received signal is 1 mV. Find the average probability of symbol for (i) BFSK and ; (ii) MSK ?

MODULE 4

17. Consider an audio signal with spectral Components limited to the frequency band of 300 to 3300 Hz. A PCM signal is generated with a sampling rate of 8000 samples. The required output signal-to-quantizing noise ratio is 30 dB.

(a) What is the minimum number of uniform quantizing levels needed, and what is the minimum number of bits per sample needed ?

(b) Calculate the minimum bandwidth required ?

Or

18. (a) With relevant waveforms explain two types of quantization error in Delta Modulation.

(4 marks)

(b) A signal $g(t) = 2 \cos 400 \pi t + 6 \cos 640 \pi t$ is ideally sampled at $f_s = 500$ Hz. If the sampled signal is passed through an ideal low-pass filter with cut-off frequency of 400 Hz, what frequency components will appear in the filter output ?

(8 marks)

MODULE 5

19. Explain QPSK scheme with its transmitter and receiver. Derive expression for probability of error.

Or

20. Consider the optimum detection of the sinusoidal signal $S(t) = \sin\left(\frac{8\pi t}{T}\right), 0 \le t \le T$ in AWGN.

(a) Determine the correlator output assuming a noiseless input. (6 marks)

(b) Determine the corresponding matched filter output, assuming that the filter includes a delay T to make it causal.

(6 marks)

[5 × 12 = 60 marks]

G 5051 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

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

DIGITAL SIGNAL PROCESSING (LTAS)

(Improvement/Supplementary/Mercy Chance)

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Obtain the system function of normalised Butterworth filter of order 2.
2. Find the cascade form realisation of the system function $H(z) = 1 + \frac{5}{2}z^{-1} + 2z^{-2} + 2z^{-3}$.
3. Prove the inherent stability property of FIR filters.
4. What is Window? Classify the different types of window functions.
5. Explain, with an example, the computational benefit achieved when DFT is obtained using FFT algorithm, compared to usual method.
6. Compute the circular convolution of the sequences :
   $x_1(n) = (1, 1, 1)$ and $x_2(n) = (1, -2, 2)$.
7. Describe finite word length effects in digital filters.
8. With an example, illustrate how the limit cycle oscillations due to overflow can be prevented?
9. Explain the model of speech production.
10. State the homomorphic significance process of speech.

(10 × 4 = 40 marks)

Part B

Answer any **one** *full question from each module.*
Each full question carries 12 *marks.*

MODULE 1

11. A discrete time system is expressed as

$$H(z) = \frac{10\left(1-\frac{1}{2}z^{-1}\right)\left(1-\frac{2}{3}z^{-1}\right)\left(1+2z^{-1}\right)}{\left(1-\frac{3}{4}z^{-1}\right)\left(1-\frac{1}{8}z^{-1}\right)\left(1-\left(\frac{1}{2}+j\frac{1}{2}\right)z^{-1}\right)\left(1-\left(\frac{1}{2}-j\frac{1}{2}\right)z^{-1}\right)}.$$

Turn over

Find the difference equation for the system. Realise the system in direct form II and also in parallel form using second order sections.

Or

12. Design a Digital Butterworth low pass filter using impulse invariant transformation for the following specifications :

$0.8 \leq H(e^{jw}) \leq 1$; for $0 \leq w \leq 0.2\pi$

$|H(e^{jw})| \leq 0.2$; for $0.6\pi \leq w \leq \pi$.

MODULE 2

13. Design a band pass linear phase FIR filter having cut-off frequencies of $w_c = 1$ rad/sample and $w_c = 2$ rad/sample. Obtain the unit sample response using the window

$$w(n) = \begin{cases} 1 & \text{for } 0 \leq n \leq 6 \\ 0 & \text{otherwise.} \end{cases}$$

Or

14. Design a FIR low pass filter using rectangular window using pass band gain of 0 dB, cut-off frequency of 200 Hz, sampling frequency of 1 kHz. Assume length of impulse response as 7.

MODULE 3

15. (a) State and prove periodicity property of DFT. (6 marks)

(b) The impulse response of a system is given as $[\underset{\uparrow}{3}, 2]$. Find the output of the system, for an input [0, 1, 0, 1] using circular convolution. (6 marks)

Or

16. Compute linear convolution of two sequences given below using DIT-FFT algorithm $x_1(n) = (1,2, 3, 4)$ and $x_n(n) = (2, 1, 2, 1)$.

MODULE 4

17. Explain fixed point arithmetic. What is the limitation of this representation ? Explain how it is overcome in floating point arithmetic. Discuss the merits and demerits of the two schemes. Give examples of practical applications of the two.

Or

18. (a) Explain the different finite word length effects that degrade the performance of FIR filters. (6 marks)

(b) Describe the various quantization errors in digital filters. (6 marks)

MODULE 5

19. Explain techniques of processing of radar signals. Discuss the applications of DSP in radar.

Or

20. (a) With a suitable block diagram, explain a channel vocoder. (6 marks)

(b) What are the applications of DSP in speech analysis and synthesis? (6 marks)

[5 × 12 = 60 marks]

MODULE 5

19. The state equations of a LTI system are given by :

$$\dot{x}(t) = \begin{bmatrix} 0 & 1 \\ -4 & -5 \end{bmatrix} x(t) + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(t),$$

where $u(t)$ is the unit step function.

(i) Determine the eigen values and eigen vectors.

(ii) Determine the state transition matrix.

Or

20. (a) What are compensators ? Why they are required ? Draw the circuit diagram, magnitude and phase plot of :

(i) lag.

(ii) lead lag compensators.

(6 marks)

(b) For the network shown in the Fig. 2 below, obtain the state model in phase variable form, taking voltage across C_2 as one state variable :

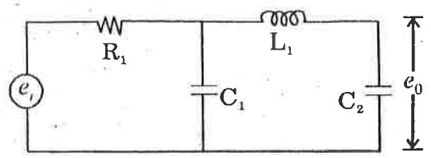

Fig. 2

(6 marks)

[5 × 12 = 60 marks]

G 5080

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

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Electronics and Communication Engineering

CONTROL SYSTEMS (L)

(Improvement/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. Name the analogous electrical elements in torque current and torque voltage analogy for the elements of mechanical rotational system.

2. Define open loop and closed loop systems. Derive the closed loop transfer function of a unity feedback system ?

3. Determine the static error coefficients K_p, K_v and K_a for the system having the transfer function $G(s)\,H(s) = \dfrac{K}{s(s+10)(s+100)}$.

4. Derive the expression for the time response of a first order control system subjected to unit step function and plot the response.

5. Define gain margin and phase margin of a control system. Explain how they can be used to determine the stability of a system ?

6. Explain : (i) asymptotes ; (ii) centroid ; (iii) break-away point ; and (iv) break-in point in the context of root loci.

7. List the procedure for constructing Bode plots ?

8. Find the value of K for critical stability of the system $G(s)\,H(s) = \dfrac{K}{s(s+1)(s+4)}$. Also find the imaginary axis crossing points of the root locus.

Turn over

9. Obtain the state transition matrix $\phi(t)$ for the following system :

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -2 & -4 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}.$$

10. With neat diagrams, explain the transfer function, magnitude and phase plot of a phase-lead compensator.

(10 × 4 = 40 marks)

Part B

Answer any **one** *full question from each module.*
Each full question carries 12 *marks.*

Module 1

11. A system is described by the following set of equations in the S-domain :

$$X_2 = X_1 - X_6 - X_3.$$
$$X_3 = G_1X_2 - H_2X_4 - H_3X_5.$$
$$X_4 = G_2X_3 - H_4X_6$$
$$X_5 = G_3X_4$$
$$X_6 = G_4X_5$$

Draw the Signal Flow Graph for the system and find the overall transfer function, taking X_1 and X_6 as the input and output respectively.

Or

12. Obtain the closed loop transfer function of the system, whose block diagram is given in Fig. 1.

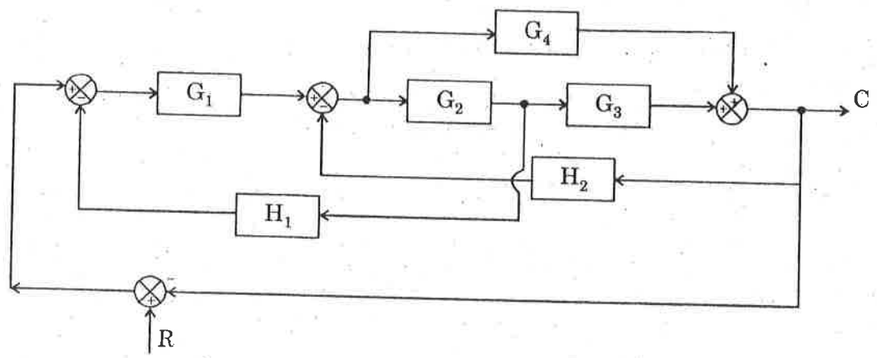

Fig. 1

Module 2

13. Obtain the responses of the second order system for (i) impulse input ; and (ii) step input. Also obtain the steady state error for the step input response.

Or

14. (a) For the negative unity feedback system with forward transfer function $G(s) = \dfrac{K(s+6)}{s(s+1)(s+7)}$, find the location of the closed loop poles when the system is marginally stable. Use Routh-Hurwitz criterion. (6 marks)

(b) Determine the stability of the system with the following characteristic equation $s^6 + 3s^5 + 5s^4 + 9s^3 + 8s^2 + 6s + 4 = 0$. (6 marks)

Module 3

15. Obtain the Nyquist plot for the following open loop transfer function, and evaluate the gain margin :

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

Or

16. The open loop transfer function of a control system is given by $G(s)\,H(s) = \dfrac{K}{s(s+2)(s+10)}$. Using Bode plots, determine the value of K, such that the system may have :

(i) gain margin of 6dB and

(ii) a phase margin of 45°.

Module 4

17. Sketch the root locus plot for a negative feedback control system having an open loop transfer function $G(s)\,H(s) = \dfrac{K}{s(s^2+6s+10)}$, for all values of K ranging from 0 to ∞. Show all salient points on the root locus.

Or

18. The open loop transfer function of a control system is $G(s)\,H(s) = \dfrac{K}{s(s+6)(s^2+4s+13)}$. Sketch the root locus and determine the :

(i) break-away points.

(ii) the stability condition.

Turn over

G 5398 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2013

Sixth Semester

Branch : Applied Electronics and Instrumentation/Electronics and Communication/Electronics and Instrumentation

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

(New Scheme—Regular)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

Part A

Each question carries 3 *marks.*

1. State sampling theorem.
2. What is the importance of group delay in LTI system ?
3. Distinguish between Butterworth and Chebyshev filter.
4. What is Gibb's phenomenon ?
5. What is the effect of windowing in Fourier analysis of signal using DFT ? (5 × 3 = 15 marks)

Part B

Each question carries 5 *marks.*

6. Determine the Z transform and region of convergence of the sequence :

   (a) $\left(\frac{1}{2}\right)^n u[n]$.

   (b) $\delta[n-1]$.

7. Determine the frequency response of a system with multiple poles and zeros.
8. Realize the system with minimum number of multipliers

   $$H(z)=\left(1+\frac{1}{2}z^{-1}+z^{-2}\right)\left(1+\frac{1}{4}z^{-1}+z^{-2}\right).$$

9. Convert the analog filter with system function $H_a(s)$ into digital filter using bilinear transformation

   $H_a(s)=\frac{2}{(s+1)(s+2)}$ with T = 1 sec.

10. Compute the N point DFT of the finite length sequence

    $$x(n)=\begin{cases} a^n ; & 0 \le N \le N-1 \\ 0 ; & \text{otherwise.} \end{cases}$$

(5 × 5 = 25 marks)

Turn over

Part C

Each question carries 12 *marks.*

11. Explain the process of Upsampling.

Or

12. Explain the process of increasing the sampling rate by an integer factor.

13. Explain the different types of linear phase system.

Or

14. Consider a stable LTI system with input $x[n]$ and output $y[n]$. The input and output satisfy the difference equation

$$y[n-1]-\frac{10}{3}y[n]+y[n+1]=x[n].$$

(a) Plote the poles and zeros in the Z plane.

(b) Find the impulse response $h[n]$.

15. Design a Chebyshev filter with a maximum passband attenuation of 1.5 dB at $\Omega_p = 2$ rad/sec and stopband attenuation of 10 dB at $\Omega_s = 30$ rad/sec.

Or

16. Consider the causal LTI system with system function

$$H(z)=\frac{2-\frac{8}{3}z^{-1}-2z^{-2}}{\left(1-\frac{1}{3}z^{-1}\right)\left(1+\frac{2}{3}z^{-1}\right)}.$$

Draw the signal flow graph for the implementation of the system in each of the form.

(a) Direct form I.

(b) Parallel combination of first order transposed direct form II sections.

17. Design a Butterworth digital filter using impulse invariant transformation. The specification of the derived low-pass filter is :

$$0.8 \le |H(w)| \le 1 \quad ; \quad 0 \le w \le 0.2\pi$$
$$|H(w)| \le 0.2 \quad ; \quad 0.32\pi \le w \le \pi.$$

Or

18. Design a FIR low-pass filter satisfying the following specifications :

$\alpha_p \le 0.1$ dB, $\alpha_s \ge 44.0$ dB

$\omega_p = 20$ rad/sec, $\omega_s = 30$ rad/sec.,

$\omega_{sf} = 100$ rad/sec.

19. Compute 8 point DFT of the sequence $x(n) = \{0, 1, 2, 3, 4, 5, 6, 7\}$ using DIF, radix – 2 FFT.

Or

20. Using linear convolution find $y(n) = x(n) * h(n)$ for the sequences

$x[n] = \{1, 2, -1, 2, 3, -2, -3, -1, 1, 1, 2, -1\}$ and $h[n] = \{1, 2\}$. Compare the result using :

(a) Overlap save method.

(b) Overlap add method.

(5 × 12 = 60 marks)