G 1629 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2018

Fourth Semester

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

AI 010 403/EC 010 403/EI 010 403—SIGNALS AND SYSTEMS [AI, EC, EI]

(New Scheme—2010 Admission onwards)

[Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

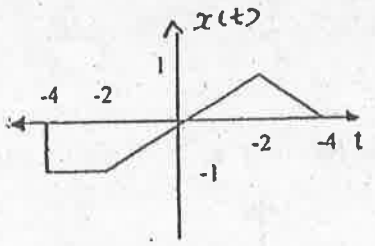
1. Determine the values of P_∞ and E_∞ of the signal $x[n] = (1/2)^n u[n+1]$.
2. Comment on the condition for existence of continuous time Fourier transform.
3. Find the DTFT of $\delta(n+3) + \delta(n-3)$.
4. Define Aliasing.
5. State the properties of ROC.

(5 × 3 = 15 marks)

Part B

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

6. Determine $x(2t+3)$, $x(-t-2)$, odd and even components of the signal $x(t)$ given in figure given below.



7. Give the modulation property of Fourier transform. Specify an application of the same.
8. Determine the DTFT of $(1/2)^n u(n)$. Plot its spectrum.

Turn over

9. Consider the signal $x(t) = \cos(2000\pi / 4) + \sin(5500\pi t)$ is sampled at the rate twice the Nyquist rate. Plot the spectrum of $x(t)$ and sampled signal.

10. Determine the Laplace transform for the signal $x(t) = 2e^{-2t}u(t) - 4e^{-t}u(-t)$ and plot the region of convergence.

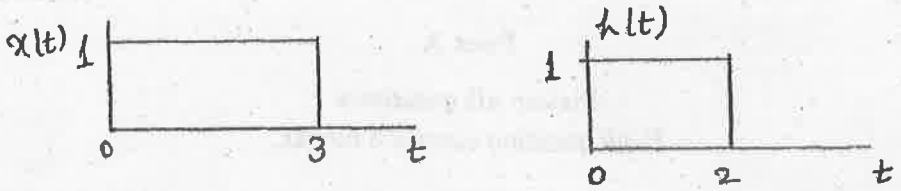
(5 × 5 = 25 marks)

Part C

Answer **all** *questions.*

Each question carries 12 *marks.*

11. The input and the impulse response of a CT-LTI system are given in



Find the output $y(t)$ of the system.

Or

12. Check whether the following systems are :

(a) Static or dynamic. (b) Linear or non-linear.

(c) Causal or non-causal. (d) Time-invariant or time -variant.

(i) $y(t) = \log_e |x(t)|$.

(ii) $5\frac{dy(t)}{dt} + 2y^2(t) = 3x(t)$. (6 + 6 = 12 marks)

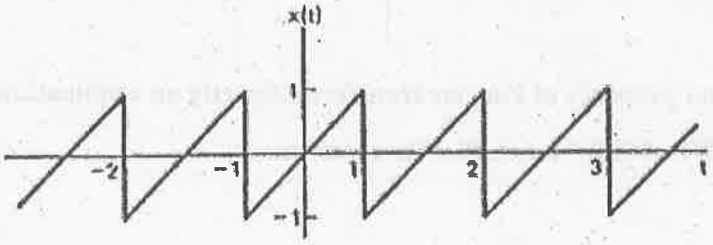
13. Find the Fourier Transform of the following : (6 + 6 = 12 marks)

(i) Gaussian signal $x(t) = e^{-at^2}$.

(ii) Gaussian modulated signal $x(t) = e^{-at^2}\cos w_c t$. (6 + 6 = 12 marks)

Or

14. (i) Determine the fourier series representation of signal $x(t)$ as shown in fig.



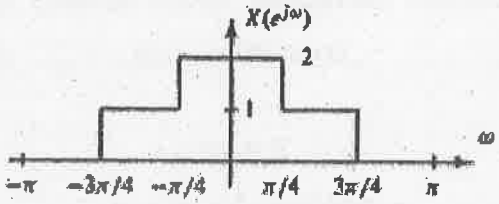
(ii) Comment on the convergence of Fourier series. (8 + 4 = 12 marks)

15. Find the DTFT of the sequence :

$$x(n) = 1 - |n| / N, -N \le n \le N$$
$$= 0, \text{ else.}$$

Or

16. Find the inverse DTFT of $X(e^{jw})$ illustrated in fig.



17. Find the half power frequency of a fifth order Chebyshev I low-pass filter with a 2 *d*B pass band edge at 1 kHz.

Or

18. Prove the sampling theorem and explain how the original signal can be reconstructed from the sampled version.

19. (i) Find the Z transform and ROC of the sequence $x(n) = \left(\frac{1}{5}\right)^n u[n-3]$.

(ii) Find the inverse Z Transform of $X(z) = 1 / (1 - 0.5 z^{-1} + 0.5 z^{-2})$ for ROC $|z| > 1$.

(6 + 6 = 12 marks)

Or

20. (i) Using Laplace transform, find the impulse response of an LTI system described by the differential equation.

$$\frac{d^2 y(t)}{d t^2} - \frac{dy(t)}{dt} - 2 y(t) = x(t).$$

(ii) Consider the difference equation $y[n] - 1/4\, y[n-1] = x[n]$ relating the input $x[n]$ and output $y[n]$ of a causal LTI system. Determine the transfer function $H(z)$ of the system.

(6 + 6 = 12 marks)

[5 × 12 = 60 marks]

G 1641 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2018

Fourth Semester

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

AI 010 404/EC 010 404/EI 010 404/IC 010 404—DIGITAL ELECTRONICS (AI,EC,EI,IC)

(New Scheme—2010 Admission onwards)

[Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. What are the characteristics of Gray code ? Give examples.
2. Define and explain Fan in, Fan out, Through put.
3. What is a latch ? What is the significance of timing diagram ?
4. Why universal registers are called so ? Explain.
5. What is a Hazard ? Write the types of Hazard.

(5 × 3 = 15 marks)

Part B

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

6. State and prove Demorgan's theorem.
7. Draw CMOS inverter and explain. Mention its application.
8. Show that NAND and NOR can be used as inverters.
9. Differentiate counters from shift registers.
10. Enumerate and explain the steps to design a hazard free combinational circuit.

(5 × 5 = 25 marks)

Part C

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

11. (a) State and prove all the laws of Boolean algebra.

    (b) Explain the properties and applications of hamming code with an example.

Or

Turn over

12. (a) Explain the principle of duality with an example.

(b) Write technical note on :

1 ASCII code.

2 K Map minimization concept.

3 XS 3 code.

13. (a) Compare and contrast the parameters of all the logic families.

(b) Explain TTL with totem pole concept with a diagram.

Or

14. (a) Discuss the characteristics of TTL and CMOS.

(b) Define and explain the gate performance parameters in detail.

15. (a) Realize the Boolean function $Y = 1 + AB + B\overline{D} + \overline{C}\overline{D}E$ using only NAND gates.

(b) Realize a full adder circuit using only NOR gates. Explain the steps.

Or

16. (a) Differentiate Encoder from Decoder. Explain the difference.

(b) Differentiate combinational circuits from sequential circuits. Explain with examples.

17. Draw a binary ripple counter and explain its operation in detail. Discuss its design details.

Or

18 (a) Explain the features of all the types of shift register.

(b) Draw a bi directional shift register and explain its principle in detail.

19. Realize the following set of simultaneous equation using PAL and PROM. Compare these Programming Technologies :

F1 (W,X,Y,Z) = X'Y'Z + WX'Y + WYZ.

F2 (W,X,Y,Z) = X'Y'Z' + W'XYZ + WYZ' + XYZ.

F3 (W,X,Y,Z) = X'YZ + XYZ + WXYZ.

Or

20. (a) Design a two bit up counter using D Flip Flops and implement it using suitable PAL. Draw the realization diagram and explain.

(b) Write a technical note on " CPLD".

(5 × 12 = 60 marks)

Part C

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

11. Derive the equation of an AM wave. Also draw the modulated AM wave for various modulation index.

Or

12. A carrier frequency of 80MHz is frequency modulated by a sine wave amplitude of 20volts and frequency of 80 MHz.the frequency sensitivity of the modulator is 20KHZ/*vdf*.

    (i) Determine the appropriate bandwidth of the FM wave by using carsons rule.

    (ii) Determine the bandwidth by transmitting only those frequencies whose amplitude exceed 1% of the unmodulated carrier amplitude.

13. (i) With a neat block diagram explain the generation of DSB-SC-AM using balanced modulator.

    (ii) Draw the VSB spectrum and explain the significance.

(8 + 4 = 12 marks)

Or

14. Draw an envelope detector circuit used for demodulation of AM and explain its operation.

15. Explain the Armstrong method to generate FM signal.

Or

16. Illustrate the Superheterodyne Receiver with a suitable block diagram.

17. Give an account on Rayleigh and Rician probability density functions.

Or

18. (i) A random variable X has a Gaussian probability density function with zero mean and unit variance. What is the probability that $|x| > 2$.

    (ii) Enumerate the properties of distribution function.

(6 + 6 = 12 marks)

19. Discuss the type's causes and effects of various forms of noise created within a receiver ?

Or

20. Write a brief note on shot noise and explain about power spectral density of shot noise.

[5 × 12 = 60 marks]

G 1658 (Pages : 2) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2018

Fourth Semester

Branch : Electronics and Communication Engineering

EC 010 405—ANALOG COMMUNICATION (EC)

(New Scheme—2010 Admission onwards)

[Supplementary]

Time : Three Hours Maximum : 100 Marks

Part A

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

1. Compare AM with DSB-SC and SSB-SC.
2. Suggest a modulation scheme for broadcast video transmission.
3. Differentiate Narrowband and Wideband FM.
4. List the conditions to be satisfied for wide sense stationary.
5. Calculate thermal noise voltage across the simple parallel RC circuit shown with :

   $R = 1k\Omega$ and $C = 1\mu F$ *at* $T = 27^0C$.

(5 × 3 = 15 marks)

Part B

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

6. A 1000 kHz carrier is simultaneously AM modulated with 300Hz, 800Hz and 1.5 kHz audio sine waves. What will be the frequencies present in the output?
7. Discuss the concept of Hilbert transform.
8. When the modulating frequency in an FM system is 400 Hz and the modulating voltage is 2.4V, the modulation index is 60 ? Calculate the maximum deviation. What is the modulating index when the modulating frequency is reduced to 250 Hz and the modulating voltage is simultaneously raised to 3.2V ?
9. Write short notes on Gaussian distribution.
10. Enumerate the call procedures of telephone systems.

(5 × 5 = 25 masrks)

Turn over