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SIXTH SEMESTER B.Sc. DEGREE EXAMINATION, MAY 2018

(SSE)

B.Sc Electronics and Computer Science

E 603 T—MODERN COMMUNICATION SYSTEM

(1999 / 2000 Admissions)

Time : Three Hours   Maximum : 75 Marks

Answer any **five** *questions.*
Each question carries 15 *marks.*

1. a) With neat diagrams explain the working of Uniselector Switches.   (7 marks)

    b) Explain detail the different types of transmission bridges used with telephone circuits.

                                                                                 (8 marks)

2. a) With block diagrams explain electronic telephone exchange switching system.   (9 marks)

    b) What are the different tones used in automatic telephony.   (6 marks)

3. a) Briefly describe about facsimile reception.   (7 marks)

    b) Explain what is meant by subcarrier frequency modulation.   (8 marks)

4. a) Define transmission path and path loss as applied to satellite communication systems.

                                                                                 (7 marks)

    b) Briefly explain the different multiple access methods used with satellite communication systems.
                                                                                 (8 marks)

5. a) Explain the different types of fibers. What are their significances ?   (7 marks)

    b) What are the different types of losses occurring in optical fibers ?   (8 marks)

6. a) Explain with block diagrams a continuous wave radar systems.   (7 marks)

    b) What is Doppler Effect ? Explain CW Doppler radars briefly.   (8 marks)

7. a) What are the different types of satellite orbits ? Explain.   (7 marks)

    b) What are the different photo-detectors used in fiber optic communication systems. (8 marks)

8. Write short note on any *three* of the following :

    a) Satellite telephony.

    b) Pagers.

    c) Saturation Flux density.

    d) Telemetry.

    e) Radar Beacons.   (3 × 5 = 15 marks)

SIXTH SEMESTER (CUCBCSS—UG) DEGREE (SPECIAL) EXAMINATION MARCH 2021

Electronics

ELE 6B 13 (C)—MICROWAVE THEORY AND TECHNIQUES

Time : Three Hours   Maximum : 80 Marks

Section A

*Answer **all** questions.*

Each question carries 1 mark.

1. ——— is a region of the electromagnetic spectrum having frequency ranging from 1 GHz to 100 GHz

2. For transverse electromagnetic wave propagation, we need ——— number of conductors.

3. The dominant mode, for rectangular waveguides is ———.

4. A ——— is nothing but a combination of E-plane. Tee and H-plane Tee.

5. ——— is an example of distributed parameter network. .

6. Reflex Klystron is an ———.

7. In ——— mode operation of magnetron, the spokes due to phase focusing effect rotate at an angular velocity corresponding to two ploes / cycle.

8. The biggest advantage of the TRAPATT diode over IMPATT diode is ———.

9. ——— diodes are widely used in frequency multiplier circuits.

10. An ——— is used in TWT to help bunching.

(10 × 1 = 10 marks)

Section B

*Answer at least **four** questions.*
Each question carries 2 marks.
All questions can be attended.
Overall Ceiling 8.

11. Distinguish between TE and TM waves.

12. Why TEM waves do not propagate in a rectangular waveguide ?

Turn over

13. What do you mean by impedance matching ?

14. What is velocity modulation ?

15. What are buncher and catcher cavities ?

16. What is transit time effects ?

17. What are Schottky diodes ?

<div align="right">(4 × 2 = 8 marks)</div>

Section C

Answer at least **four** *questions.*
Each question carries 8 marks.
All questions can be attended.
Overall Ceiling 32.

18. What are the application of microwaves ?

19. Derive the expression for cut - off frequency of a rectangular waveguide.

20. What are the design considerations for microwave strip lines ?

21. What is VSWR ? Obtain a relation for VSWR in terms of reflection co-efficient.

22. Explain the bunching process in reflex klystron.

23. What are Gunn diodes ? What are their applications ?

24. Explain the working of TRAPATT diodes.

25. What are cavity resonators ?

<div align="right">(4 × 8 = 32 marks)</div>

Section D

Answer any **two** *question.*
Each question carries 15 marks.

26. Derive the transmission line equations.

27. Explain in detail the working of a magnetron.

28. Explain with S matrix the different microwave components.

29. Write short notes on :

   (a) Group velocity and phase velocity.

   (b) Tunnel diodes.

   (c) Cross field amplifiers.

<div align="right">(2 × 15 = 30 marks)</div>

SIXTH SEMESTER (CUCBCSS—UG) DEGREE (SPECIAL) EXAMINATION MARCH 2021

Electronics

ELE 6B 12—CONTROL SYSTEMS

Time : Three Hours   Maximum : 80 Marks

Section A

Answer all questions.
Each question carries 1 mark.

1. Servomotors are used to convert ———— signal into ————.

2. An element which stores potential energy is ————.

3. Signal flow graph can be used to represent ———— systems.

4. The inverse Laplace transform of the transfer function of a system is its ————.

5. The time required for the response to reach 50 % of the final value in the first attempt is called the ————.

6. The number of open loop poles on the origin of the s-plane indicates the ———— of the system.

7. Bode plots are drawn on a ———— sheet.

8. Gain margin and phase margin must be ———— for a stable system.

9. The number of branches of the root locus terminating on infinity is equal to ————.

10. The lead network acts as a ———— filter.

(10 × 1 = 10 marks)

Section B

*Answer at least **four** questions.*
Each question carries 2 marks.
All questions can be attended.
Overall Ceiling 8.

11. What do you mean by feedback ?

12. Name the analogous electrical elements in torque-current analogy for mechanical rotational system.

13. What are non-touching loops ?

14. Define order of a system.

15. What is damping factor ?

16. Give the applications of root locus.

17. Define gain crossover frequency.

<div align="right">(4 × 2 = 8 marks)</div>

Section C

Answer at least **four** *questions.*

Each question carries 8 *marks.*

All questions can be attended.

Overall Ceiling 32.

18. Give a comparison between open loop and closed loop systems.

19. State and prove convolution theorem in Laplace transform.

20. What are the features of electromagnetic field D.C. servomotors ?

21. Compare block diagram and signal flow graph methods.

22. Explain the properties of Type 0, Type I and Type II systems.

23. Write the properties of Root locus.

24. Explain the concept of lag compensators. Where it is preferred ?

25. Write notes on PID controller.

<div align="right">(4 × 8 = 32 marks)</div>

Section D

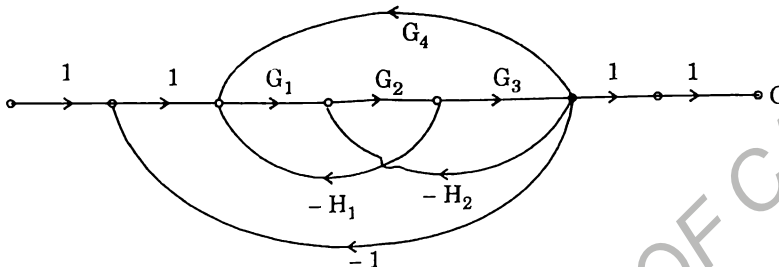*Answer any* **two** *question.*

Each question carries 15 *marks.*

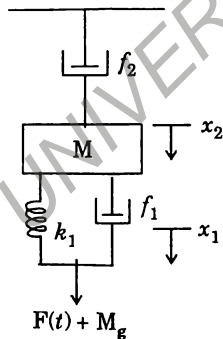26. Find the impulse and step response of the following systems :

(a) $H(s) = \dfrac{10}{s^2 + 6s + 10}$.

(b) $H(s) = \dfrac{s + 2}{s^2 + 5s + 4}$.

27. Write the differential equation for the mechanical system shown and draw the electrical circuit in the force-voltage and force-current analogy.

28. Write the transfer function for the mechanical system shown below :

29. A unity feedback control system is characterized by the open-loop transfer function

$$G(s) = \frac{K(s+13)}{s(s+3)(s+7)}$$

   (a) Calculate the range of values of K for the system to be stable.

   (b) What is the marginal value of K for stability ? Determine the frequency of oscillations if any.

(2 × 15 = 30 marks)

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(Pages : 3)

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SIXTH SEMESTER (CUCBCSS—UG) DEGREE [SPECIAL] EXAMINATION MARCH 2021

Electronics

ELE 6B 11—PRINCIPLES OF DIGITAL SIGNAL PROCESSING

Time : Three Hours   Maximum : 80 Marks

Section A

*Answer **all** questions.*
Each question carries 1 mark.

1. For an even signal, $x(-n)$ = ——————— for all values of n.

2. For an anti-causal signal, $x(n) = 0$ for ———————.

3. The Laplace transform of $u(t)$ is ———————.

4. The Z-transform of $x(n)$ is same as the discrete-time Fourier transform of ———————.

5. For a discrete time system to be stable, its impulse response must be ———————.

6. ——————— is the process of finding the impulse response $h(n)$ from $y(n)$.

7. Z-transform of $u(-n)$ is ———————.

8. In ——————— systems, the impulse response consists of finite number of samples.

9. The FFT may be defined as ——————— for computing the DFT.

10. The direct computation of DFT requires ——————— real multiplications and ——————— real additions.

$(10 \times 1 = 10$ marks)

Section B

*Answer at least **four** questions.*
Each question carries 2 marks.
All questions can be attended.
Overall Ceiling 8.

11. What is a multidimensional signal ?

12. What are the basic operations on a signal ?

13. State the convolution property in Laplace transforms.

14. What do you mean by system function ?

15. What is an FIR system ?

Turn over

16. What is zero padding ?

17. What is the need for FFT algorithm ?

<div align="right">(4 × 2 = 8 marks)</div>

Section C

Answer at least **four** *questions.*
Each question carries 8 marks.
All questions can be attended.
Overall Ceiling 32.

18. Determine whether or not the following signals are periodic. If periodic find its fundamental period :

    i) $x(n) = e^{j\frac{3}{5}\left(n + \frac{1}{2}\right)}$.

    ii) $x(n) = \cos\frac{\pi}{3}n + \cos\frac{3\pi}{4}n$.

19. Check whether the following systems are : i) static or dynamic ; ii) linear or non-linear ; iii) causal or non-causal :

    i) $y(n) = \sum\limits_{k=-\infty}^{n+4} x(k)$.

    ii) $y(n) = |x(n)|$.

20. Find the convolution of the sequences using Z-transforms :

    $$x_1(n) = \left[\frac{1}{2}\right]^n u(n) \ ; \ x_2(n) = \left[\frac{1}{3}\right]^{n-2} u(n-2).$$

21. Explain the shifting property in Z-transform.

22. Using final value theorem, find $x(\infty)$ if X (z) is given by :

    a) $\dfrac{z+2}{4(z-1)(z+0.7)}$.

    b) $\dfrac{2z+3}{(z+1)(z+3)(z-1)}$.

23. Find the circular convolution of $x_1(n) = \{1,2,1,2\}$; $x_2(n) = \{4,3,2,1\}$.

24. Determine the impulse response of the system described by the difference equation

    $$y(n) - 3y(n-1) - 4y(n-2) = x(n) + 2x(n-1).$$

25. Explain the features of radix-2 DIT FFT algorithm.

<div align="right">(4 × 8 = 32 marks)</div>

Section D

Answer any **two** *questions.*
Each question carries 15 marks.

26. a) Define various elementary discrete signals. Indicate them graphically.

    b) Discuss the basic properties of Z-transform.

27   Discuss the stability of the system given by the difference equation :

$$y(n) = y(n-1) - 0.5y(n-2) + x(n) + x(n-1).$$

Also find the response of the system for a unit step and impulse.

28.   Find the direct form I and direct form II realizations of the following LTI system

$$H(z) = \frac{3z^3 - 5z^2 + 9z - 3}{\left[z - \frac{1}{2}\right]\left[z^2 - z + \frac{1}{3}\right]}.$$

29.   Compute the DFT of the following sequence using : i) DIT FFT ; ii) DIF FFT

$$x(n) = \{1, -1, -1, -1, 1, 1, 1, -1\}.$$

(2 × 15 = 30 marks)

SIXTH SEMESTER (CUCBCSS—UG) DEGREE [SPECIAL] EXAMINATION MARCH 2021

Electronics

ELE 6B 10—COMMUNICATION SYSTEMS

Time : Three Hours   Maximum : 80 Marks

Section A

*Answer **all** questions.*
Each question carries 1 mark.

1. The equation for full carrier AM is ———————.

2. The peak voltage of an AM signal goes from E_{max} to E_{min}, the modulation index, m is ———————.

3. The SC in SSB – SC Stands for ———————.

4. FM bandwidth can be approximated by——————— rule.

5. In FM, ——————— is used to increase the signal to noise ratio for high audio frequencies.

6. In FM, the frequency deviation is proportional to the instantaneous——————— of the modulating signal.

7. Almost all modern receivers use the ——————— principle.

8. In free space radio waves travel at the speed of ———————.

9. Nyquist rate of sampling can be expressed as ———————.

10. The number of symbols per second is called the ———————.

$(10 \times 1 = 10 \text{ marks})$

Section B

*Answer at least **four** questions.*
Each question carries 2 marks.
All questions can be attended.
Overall Ceiling 8.

11. What is the need for modulation ?

12. What is high level modulation ?

Turn over

13. Define Phase modulation. How it differ from FM ?

14. What is an Intermediate frequency ? What is its significance ?

15. What is an amplitude limiter ? How is it advantageous ?

16. What is quantization Noise ?

17. What are shift keying techniques ?

(4 × 2 = 8 marks)

Section C

Answer at least **four** *questions.*
Each question carries 8 marks.
All questions can be attended.
Overall Ceiling 32.

18. Obtain the power relation for nn AM wave.

19. Explain SSB transmission using Filter method

20. What is a noise triangle ? Explain

21. Distinguish between Narrow band FM and wideband FM,

22. Explain the-transmission and reception of PWM.

23. Discuss in detail critical frequency and MUF.

24. What is image frequency ? How can it be eliminated ?

25. Explain in detail TDM.

(4 × 8 = 32 marks)

Section D

Answer any **two** *questions.*
Each question carries 15 marks.

26. Explain the block diagram of communication system and also write the application of communication system.

27. Explain in detail the Indirect method of FM generation.

28. What is Propagation ? Briefly explain the different types of propagation.

29. Write short note on:

    a)   AGC ; b) Stereo phonic FM transmission; and c) DPSK.

(2 × 15 = 30 marks)