5E1780

Roll No. _____ [Total No. of Pages : 2

5E1780

B.Tech. V-Sem. (Main&Back) Examination, November/December - 2025
Electronics and Communication Engineering
5EC 3-01 Computer Architecture

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates:

Attempt all Ten questions from Part A, Five questions out of Seven questions from Part B and Three questions out of Five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No. 205).

PART - A

(Answer should be given up to 25 words only)

All questions are Compulsory. **(10×2=20)**

1. How does context switching affect the performance of software systems?
2. What is the difference between signed and unsigned binary numbers?
3. State one key difference between hardwired and microprogrammed control units.
4. What is the main function of the control unit in a CPU?
5. Define virtual memory. Why is it used?
6. Differentiate between programmed I/O and DMA.
7. What is IEEE 754 standard used for?
8. What is the role of the program counter (PC) in instruction sequencing?
9. List the main components of a computer system organization.
10. List any two tasks performed by the CPU control unit during instruction execution.

PART - B

(Analytical / Problem Solving Questions)

Attempt any Five questions. **(5×4=20)**

1. Design a 1-bit ALU circuit that performs addition and logical AND operations. Show the truth table and logic diagram.
2. Explain the role of the multiplier control unit in the hardware implementation of multiplication operations.
3. Analyze the advantages and disadvantages of associative memory in cache implementation.
4. Explain the role of RAM and ROM in the memory hierarchy of a computer system.
5. Analyze the differences between programmed I/O, interrupt-driven I/O, and Direct Memory Access (DMA). Discuss how each impacts system performance.
6. Compare FIFO (First-In-First-Out) and LIFO (Last-In-First-Out) mechanisms with suitable use cases in computer systems.
7. Define an instruction set. List any three common types of instructions found in a typical instruction set architecture.

PART - C

(Descriptive / Analytical / Problem Solving / Design Questions)

Attempt any Three questions. **(3×10=30)**

1. Write an assembly language program to perform the addition of two numbers and store the result in memory. Explain each instruction used.
2. Define floating point representation. What are the main components of a floating point number according to the IEEE 754 standard?
3. Write short notes on the following topics:
   a) Microprogrammed Control Unit
   b) Stack and Its Use in Subroutine Calls
   c) DMA (Direct Memory Access)
   d) Cache Memory and Its Mapping Techniques
4. Explain the organization and interaction between the control unit, ALU, memory unit, and I/O system in a basic computer system. Use a labeled diagram.
5. Define machine instruction. List and briefly explain any five common types of machine instructions used in computer architecture.

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5E1781

B.Tech. V-Sem. (Main&Back) Examination, November/December - 2025
Electronics and Communication Engineering
5EC4-02 Electromagnetics Waves

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates:

Attempt all Ten questions from Part A, Five questions out of seven questions from Part B and Three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No. 205).

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory. **(10×2=20)**

1. Justify that a magnetic field is a solenoid in nature.
2. What is divergence theorem?
3. Define the reflection coefficient and VSWR.
4. What is the order of Laplace's and Poisson equations?
5. What is difference between electric dipole and magnetic dipole?
6. Find the EM Wave velocity in medium in which $\varepsilon_r = 9$.
7. What is pointing vector? Explain and derive its expression.
8. What is meant by scalar and vector fields?
9. Define displacement current density.
10. What is stub?

PART - B

(Analytical / Problem Solving Questions)

Attempt any Five questions. **(5×4=20)**

1. What is Smith Chart? How it can be used to determine load impedance and input impedance of a terminated line?

2. Ampere's magnetic circuit law cannot be used to find the field intensity of line current of finite length. Explain why?
3. Change the vector $A = 10i + y^2z\,j$ in cylindrical coordinating system.
4. How quarter-wave transmission (QWT) line acts as an impedance transformer?
5. If an electric field $E = 2i + 24\,j$ is incident at $x = 0$ from one medium $\varepsilon_{r1} = 4$ to second medium $\varepsilon_{r2} = 9$ then find the electric field in the second medium.
6. What is boundary condition? Develop relation between normal and tangential electric field at the interface of two media.
7. An inductive reactance of $j25\Omega$ is to be realized by using a short circuited transmission line of characteristic impedance of 50Ω operating at 1GHz. Find out the minimum length of short circuited line (in cm).

PART - C

(Descriptive / Analytical / Problem Solving / Design Questions)

Attempt any Three questions. **(3×10=30)**

1. A good conductor is located in a static electric field. Why.
   a) No field exists inside a conductor?
   b) Charges are only on its surface?
   c) Potential on its surface is same everywhere?
2. Find all electric and magnetic fields expression for TE mode inside a rectangular waveguide with the help of Maxwell's equations.
3. Find the total electric field at a point (0, 0, 2) due to two charges of equal in magnitude (10C) and opposite in nature which are placed at the point (0, -2, 2) and (4, 0, 2), respectively.
4. Define the following terms:
   a) Wave Impedance,
   b) Energy Density,
   c) Ampere's Law and
   d) Conservative Field.
5. Write the differential and integral form of all four Maxwell's equations in lossy medium.

5E1782

Roll No. _____ [Total No. of Pages : 3

5E1782

B.Tech. V-Sem. (Main&Back) Examination, November/December - 2025
Electronics and Communication Engineering
5EC4-03 Control System

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates:

Attempt all Ten questions from Part A, Five questions out of seven questions from Part B and Three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205).

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory. **(10×2=20)**

1. Draw the polar plot for function, $G(s)=\frac{1}{s^3(s+1)}$. $H(s)=1$
2. Define stability for a linear time invariant system.
3. Differentiate closed loop and open loop control system.
4. What is the value of gain K at any given point on the root locus?
5. Explain Nyquist Stability criterion.
6. What do you mean by Non-linear system? Explain.
7. Write down the merits and demerits of phase lag-lead compensation.
8. Draw and explain LVDT.
9. In own word, explain transient accuracy in control system.
10. An automatic washing machine is which type loop system? Explain it.

PART - B

(Analytical/Problem Solving Questions)

Attempt any Five questions. **(5×4=20)**

1. Sketch the polar plot for $G(s)=\dfrac{1}{s(s+1)}$

2. Construct the Nyquist plot for a unity feedback control system whose open loop transfer function is $G(s)\cdot H(s)=\dfrac{k}{s(s^2+2s+2)}$

   Find, the maximum value of k for which the system is stable.

3. Consider a feedback control system with loop transfer function,

   $G(s)\cdot H(s)=\dfrac{k(1+0.5s)}{s(1+s)(1+2s)}$. Find, which type of closed loop system and why?

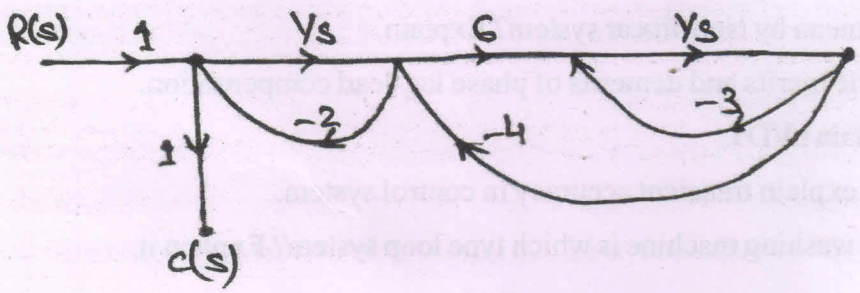
4. Consider a system described by the following difference equation,

   $y(n+3)+6y(n+2)+11y(n+1)+6y(n)=r(n+2)+9r(n+1)+20r(n)$, where y is output and r is input. Find the transfer function of system.

5. The Bode plot of the system is $G(s)=\dfrac{10}{0.66s^2+2.33s+1}$. Find its corner frequencies.

6. Explain the affect when a tachometer is added to a servomechanism.

7. The signal flow graph of a system shown below,



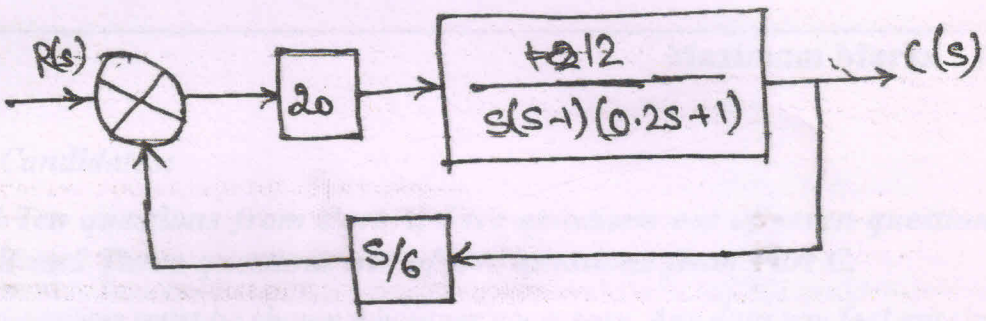
Find the transfer function of given system.

PART - C

(Descriptive / Analytical / Problem Solving / Design Questions)

Attempt any Three questions. **(3×10=30)**

1. The block diagram of a simple servo system is



Find:

a) The characteristics equation of system,

b) Damped and undamped frequency of oscillation,

c) Damping ratio,

d) Maximum overshoot,

e) Settling time.

2. Write a short note on:

a) Optimal control system,

b) Non-linear control system.

3. A certain feedback control system is described by $G(s)=\frac{k}{s^2(s+20)(s+30)}$, $H(s)=1$.

a) Determine steady state error coefficients.

b) Also determine the value of k to limit the steady state error to 10 units due to input $r(t)=1+10t+20t^2$. **(5+5)**

4. Explain lead compensator design using Bode Plot.

5. A unit feedback system is described by $G(s)\cdot H(s)=\frac{10}{s(1+0.2s)(1+0.01s)}$.

Construct a Bode plot and find,

a) Gain and Phase crossover frequency,

b) Gain and Phase margin,

c) Stability of closed loop system.

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5E1783

B.Tech. V-Sem. (Main&Back) Examination, November/December - 2025
Electronics and Communication Engineering
5EC4-04 Digital Signal Processing

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates:

Attempt all Ten questions from Part A, Five questions out of seven questions from Part B and Three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205).

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory. **(10×2=20)**

1. Define discrete-time signal and give one example.
2. State any two properties of Z-Transform.
3. What is aliasing in signal sampling?
4. Write the relationship between linear convolution and circular convolution.
5. Define Discrete Fourier Transform (DFT).
6. What is meant by spectral estimation?
7. Mention two applications of multirate signal processing.
8. Define the Radix-2 FFT algorithm.
9. What is the need of FFT over DFT?
10. State the effect of finite register length in digital filters.

PART - B

(Analytical / Problem Solving Questions)

Attempt any Five questions. **(5×4=20)**

1. Derive the condition for stability of a discrete-time signal using Z-Transform.

2. Compute the 4-point DFT of the sequence $x(n) = \{1, 2, 3, 4\}$.

3. Compare Butterworth and Chebyshev filters in terms of characteristics and applications.

4. Discuss the application of DSP in speech and image processing.

5. Differentiate between low-pass, band-pass and high-pass digital filters with sketches.

6. Explain the effect of finite word length on digital filter performance.

7. Explain FIR filters design using the Park-McClellan algorithm.

PART - C

(Descriptive / Analytical / Problem Solving / Design Questions)

Attempt any Three questions. **(3×10=30)**

1. A discrete-time signal is given by $x[n] = 2^n \mu(n)$.

   a) Find its Z-Transform and region of convergence.

   b) Using the inverse Z-Transform, reconstruct $x[n]$.

2. Design a digital low-pass FIR filters using Hamming Window with cut off frequency 1 KHz and sampling frequency 8 KHz, filter length N = 21.

3. Discuss the effects of finite register length on FIR and IIR filters with suitable numerical example. Suggest ways to minimize the effect.

4. Explain multirate signal processing and describe its application in modern DSP system like sub-band coding or audio compression.

5. A signal is processed using fixed point arithmetic system with 8-bit word length.

   a) Calculate the Quantization error introduced.

   b) Discuss its impact on FIR filter output.

5E1784

Roll No. _____ [Total No. of Pages : 2

5E1784

B.Tech. V-Sem. (Main&Back) Examination, November/December - 2025
Electronics and Communication Engineering
5EC4-05 Microwave Theory and Techniques

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates:

Attempt all Ten questions from Part A, Five questions out of seven questions from Part B and Three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205).

PART - A

(Answer should be given up to 25 words only)

All questions are compulsory. **(10×2=20)**

1. What are the advantages of microwaves?
2. Define the reflection coefficient and standing wave ratio.
3. Draw the field lines for TE_{10} and TE_{11} modes of a rectangular waveguide.
4. Define the S-parameters and its properties.
5. Draw the symbol of a circulator and its application.
6. What is transit time, and what are its implications?
7. What are BARITT diodes?
8. Write the advantages of tropospheric scatter.
9. What affects radar range and resolution?
10. What is transponder? How many transponders are used on a typical satellite?

PART - B

(Analytical / Problem Solving Questions)

Attempt any Five questions. **(5×4=20)**

1. Write down the concept of mode and feature of TEM, TE and TM modes.

2. Derive expression for the fields in rectangular waveguides in case of Transverse Magnetic (TM) wave Hz = 0.
3. Derive the S-matrix of an ideal Magic Tee.
4. What are the salient features of TWT? How it is able to give large bandwidth?
5. Explain the function of the PIN diodes and Varactor diodes.
6. Describe the measurement of frequency by slotted line method.
7. What is the basic function of the communication satellite? Why is it needed? Why are the uplink and down link frequencies different?

PART - C

(Descriptive / Analytical / Problem Solving / Design Questions)

Attempt any Three questions. **(3×10=30)**

1. A rectangular waveguide has a cross-sectional area of 2.29×1.45 cm^2, and the operating frequency is 104 Hz. Calculate the following:
   a) free space wavelength,
   b) cut-off wavelength,
   c) guided wavelength,
   d) phase velocity in the guide,
   e) wave impedance of the waveguide.
2. What is directional coupler? Describe various performance parameters of coupler. Derive the S-matrix of an ideal directional coupler.
3. What is magnetron? Mention different types of magnetrons and describe the travelling wave magnetron.
4. Design a maximally flat low-pass filter with a cut off frequency of 2 GHz, impedance of 50Ω, and at least 15 dB insertion loss at 3GHz.
5. Write notes on following:
   a) Microwave Antennas.
   b) Radar.
   c) EMI and EMC.
   d) Monolithic Microwave ICs.
   e) RFMEMS for microwave components.

5E1787

Roll No. _____ [Total No. of Pages : 2

5E1787

B.Tech. V-Sem. (Main&Back) Examination, November/December - 2025
Biomedical Engineering
5BM5-11 Satellite Communication
BM, EC

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates:

Attempt all Ten questions from Part A, Five questions out of Seven questions from Part B and Three questions out of Five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205).

PART - A

(Answer should be given up to 25 words only)

All questions are Compulsory. **(10×2=20)**

1. What do you meant by active and passive satellites?
2. In what way satellite has an edge in communication compared to other methods?
3. State and explain Kepler's laws in the context of satellite motion.
4. What is the difference between apogee and perigee?
5. What is attitude and orbit control subsystem?
6. What is meant by frequency reuse? Explain it.
7. What is the effect of solar eclipse on satellite communication?
8. What is Sun Transit Outage Phenomena?
9. What is the system noise temperature?
10. Explain the concept of multiple access schemes in satellite systems.

PART - B

(Analytical / Problem Solving Questions)

Attempt any Five questions. **(5×4=20)**

1. Explain the various frequency bands used in satellite communication. Compare the merits and demerits of different bands.
2. The apogee and perigee of an elliptical satellite orbits are 3000 km and 200 km. Determine the eccentricity, semi-major axis and semi-minor axis.
3. Define sidereal day and solar day. How are they relevant to satellite communication?
4. Explain Doppler Shift and how it impacts satellite communication.
5. Explain the role of the attitude and Orbit Control System (AOCS).
6. What is a link budget and why is it important?
7. Define TDMA, FDMA and CDMA. Discuss their receiver merits and demerits.

PART - C

(Descriptive / Analytical / Problem Solving / Design Questions)

Attempt any Three questions. **(3×10=30)**

1. A satellite is moving in a circular orbit at a height of 150 km above the surface of earth. If the radius of earth is 6360 km, determine the orbital velocity and orbital period of the satellite.

   ($G = 6.67 \times 10^{-11}$ Nm^2/kg, $M = 5.98 \times 10^{24}$ kg)
2. Describe the telemetry, tracking and command facilities of a satellite communication system. Do they are a part of space segment or ground segment.
3. Write short notes on the following:

   a) Link performance

   b) Link budget
4. A geostationary satellite is located at a distance of 3000 km with an operating frequency 14.35 GHz. The gain of transmitting and receiving antennas are 15 and 20 simultaneously. If the transmitter power is 200 kW. Calculate the power received by the receiving antenna.
5. Describe any two modulation schemes used in satellite communications.

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5E1392

B.Tech. V-Sem. (Mercy Back) Examination, November/December - 2025
Electronics and Communication Engineering
5EC4-02 Electromagnetics Waves

Time : 3 Hours **Maximum Marks : 120**
Min. Passing Marks:42

Instructions to Candidates:

Part-A: Short answer questions (up to 25 words) (10×2=20) marks. All ten questions are compulsory.

Part-B: Analytical/Problem solving questions (up to 100 words) (5×8=40) marks. Candidate has to answer five questions out of seven.

Part-C: Descriptive/Analytical/Problem solving questions (4×15=60) marks. Candidates have to answer four questions out of five.

PART - A

(Answer should be given up to 25 words only)

All questions are Compulsory. **(10×2=20)**

1. Write the statement of ampere's law.
2. Write the unit of electric flux.
3. Define the reflection coefficient and VSWR.
4. What is the order of Laplace's and Poisson equations?
5. What is difference between electric dipole and magnetic dipole?
6. Find the value of divergence of magnetic filed in vacuum.
7. Draw the pattern of electric field in which divergence is non-zero.
8. What is meant by scalar and vector fields?
9. *If* $V(x, y, z) = 2.5x^2yz$ then find electric field at point (2,0,0).
10. What is Smith chart?

PART - B

(Analytical / Problem Solving Questions)

Attempt any Five questions. **(5×8=40)**

1. Change the vector $A=20i+y^2zj$ in cylindrical coordinating system.
2. Discuss the magnetic vector potential and compare it with electric potential.
3. How Quarter-Wave Transmission (QWT) line acts as an impedance transformer?
4. If an electric field E=2i+24 j is incident at x=0 from one medium $\varepsilon_{r1} = 4$ to second medium $\varepsilon_{r2} = 9$ then find the electric field in the second medium.
5. How Maxwell's equations are related with faraday law of induction and Gauss law.
6. Draw the electric and magnetic field lines in TEM: assume the EM wave is propagating in the direction of x-axis.
7. Write the differential and integral form of all four Maxwell's equations in lossy medium.

PART - C

(Descriptive / Analytical / Problem Solving / Design Questions)

Attempt any Four questions. **(4×15=60)**

1. A rectangular waveguide with a =5cm, b=2cm cross section is used to propagate TM_{11} mode at 10GHz. Determine the cut-off wavelength, guided wavelength, phase velocity, characteristics impedance and attenuation.
2. Find the input impedance, reflection coefficient and VSWR on transmission line terminated by open circuit, short circuit and matched with load.
3. Find all electric and magnetic fields expression for TE mode inside a rectangular waveguide with the help of Maxwell's equations.
4. An inductive reactance of $j25\,\Omega$ is to be realized by using a short circuited transmission line of characteristic impedance of $50\,\Omega$ operating at 1GHz. Find out the minimum length of short circuited line (in cm).
5. Define the following terms of waveguide propagation:
   a) Cut-off frequency;
   b) Dominant Mode;
   c) Degenerate Mode.

5E1393

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5E1393

B.Tech. V-Sem. (Re Back) Examination, November/December - 2025
Electronics & Communication Engineering
5EC4-03 Control System

Time : 3 Hours **Maximum Marks : 120**
Min. Passing Marks:42

Instructions to Candidates:

Attempt all Ten questions from Part A, Five questions out of seven questions from Part B and Four questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No. 205).

PART - A

(Answer should be given up to 25 words only)

All questions are Compulsory. **(10×2=20)**

1. State the conditions that must be satisfied by a linear model of a system.
2. Write any one difference between optimal control and non-linear control.
3. Under What conditions we can apply Laplace transform for system analysis; can initial conditions be incorporated in the time response analysis?
4. What kind of feedback element is used in a speed control system?
5. Define actuator.
6. Which test signal is employed for testing the time response of a control system?
7. What is the nature of the response of second-order type-1 system to unit step input?
8. How can we determine the relative stability of a system using Routh stability test?
9. What is the meaning of marginally stable system?
10. Why Root locus must be symmetrical about the real axis?

PART - B

(Analytical / Problem Solving Questions)

Attempt any Five questions. **(5×8=40)**

1. A unity feedback system has plant transfer function of G(s)=K(s+4)/(s-1) (s-2). What would be the value of K for a phase margin of 30 degree and what is the corresponding gain margin.
2. How is the relative stability can be judged qualitatively from the Nyquist plot?
3. What is break frequency in Bode magnitude plot? Explain , What is the asymptotic bode plot with the help of single factor $(j\omega\tau+1)$.
4. Explain how to determine the angle of departure from a pole and the angle of arrival at a zero in a root locus plot.
5. Define the concept of controllability and observability.
6. What is PID controller and how does it combine the beneficial effect of both PD and PI controller?
7. Define the working principle of servomotor.

PART - C

(Descriptive / Analytical / Problem Solving / Design Questions)

Attempt any Four questions. **(4×15=60)**

1. What are the differences between AC and DC servomotor?
2. The open-loop transfer function of a unity feedback control system is given by $G(s)=\frac{K}{(s+2)(s+4)(s^2+6s+2s)}$ by applying Routh criterion; discuss the stability of the closed-loop system as a function of K. Determine the value of K which will cause sustained oscillations in the closed loop system. What are the corresponding oscillation frequencies?
3. Show that the PID controller base has phase-lag behavior in low frequency region and phase-lead behavior in high frequency region.
4. For a unity feedback system having an open-loop transfer function. $G(s)=K(s+2)/s(s^3+7s^2+12s).$ Determine the i) type of system, ii) error constant K_p, K_v, K_a and iii) steady-state error for parabolic input.
5. What are the two ways in which the frequency response of a system can be represented? The asymptotic bode magnitude plot of a system is sketched in Fig.1 Write the expression for its transfer function in frequency domain. Also draw its asymptotic phase plot.

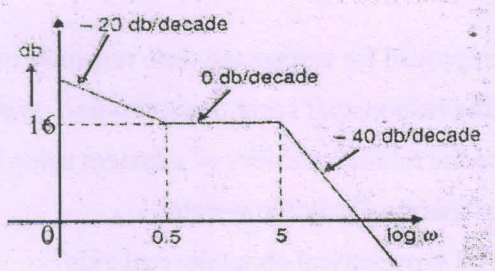

Fig.1

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5E1394

B.Tech. V-Sem. (Re-Back) Examination, November/December - 2025
Electronics and Communication Engineering
5EC4-04 Digital Signal Processing

Time : 3 Hours **Maximum Marks : 120**
Min. Passing Marks:42

Instructions to Candidates:

Attempt all Ten questions from Part A, Five questions out of seven questions from Part B and Four questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No. 205).

PART - A

(Answer should be given up to 25 words only)

All questions are Compulsory. **(10×2=20)**

1. What is decimator?
2. Define linear shift invariant system.
3. What is anti-aliasing filter?
4. What is signal processing?
5. What are the conditions for a FIR system to have linear phase?
6. Give the example of circular convolution.
7. Determine the order of the LPF for Butterworth approximate, with 3dB attenuation at 500 Hz and an attenuation of 40dB at 1000Hz.
8. What are finite word-length effects?
9. Write any two limitations of DSP.
10. Write any two applications of DSP.

PART - B

(Analytical / Problem Solving Questions)

Attempt any Five questions. **(5×8=40)**

1. How can you design a digital filter from analog filter?
2. Explain the interpolation process with an example.
3. Find the z-transform of $x(n)=2^n u(n-2)$.
4. Explain how band limited signal can be reconstructed from its sample.
5. What is the need for multi-rate signal processing?
6. How to find linear convolution of two sequences using DFT?
7. Explain the process of Decimation by a factor of M with suitable block diagrams.

PART - C

(Descriptive / Analytical / Problem Solving / Design Questions)

Attempt any Four questions. **(4×15=60)**

1. Derive the expressions for order and cut-off frequency of a butterworth filter.
2. Write the advantages and disadvantages of FIR and IIR filters.
3. Derive the DFT of the sample data sequence $x(n)=\{1,1,2,2,3,3\}$ and compute the corresponding amplitude spectrum.
4. State and prove properties of Z transform.
5. Write short note on:
   a) Park-McClellan's Method,
   b) Bandpass Filter,
   c) FFT Algorithm.

5E1395

Roll No. _____ [Total No. of Pages : 2

5E1395

B.Tech. V-Sem. (Mercy Back) Examination, December - 2025
Electronics and Communication Engineering
5EC4-05 Microwave Theory & Techniques

Time : 3 Hours **Maximum Marks : 120**

Min. Passing Marks:42

Instructions to Candidates:

Attempt all Ten questions from Part A, Five questions out of seven questions from Part B and Four questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No. 205).

PART - A

(Answer should be given up to 25 words only)

All questions are Compulsory. **(10×2=20)**

1. Write the full name of EMI and EMC.
2. Write the name of any two network parameters for microwave analysis.
3. Define the directivity and coupling factor of directional coupler.
4. Draw the physical structure and field pattern of strip line.
5. Why Hybrid-Tee called a Magic-T?
6. Write two advantages micro-strip line over waveguides.
7. What do you mean by Quasi-TEM mode of propagation?
8. What is fringing effect?
9. Draw field configuration of TE_{10} and TE_{11} modes in a rectangular waveguide.
10. Write any two applications of microwave.

PART - B

(Analytical / Problem Solving Questions)

Attempt any Five questions. **(5×8=40)**

1. Explain working principle of Gunn diode.
2. What do you understand by MMIC? How it is differ from MIC?
3. Define the following terms for waveguide:
   a. Cut-off Wavelength
   b. TE Mode
   c. TM Mode
4. Draw the electric and magnetic field patterns of strip line.
5. What are the losses associated in microwave transmission.
6. What is scattering parameters? Write the properties of scattering parameters.
7. Explain the working principle of spectrum analyzer.

PART - C

(Descriptive / Analytical / Problem Solving / Design Questions)

Attempt any Four questions. **(4×15=60)**

1. Write the design steps for Microwave Oscillator.
2. Explain working principle of Gunn Effect and draw its multi valley energy bank diagram.
3. Describe the fabrication process of MMIC. Why MMICs are superior to hybrid MICs?
4. A strip line has the following parameters: relative dielectric constant E_r=2.25, strip width w=2mm, strip thickness t=0.5mm and shield depth d=4mm. Calculate K-factor, fringe capacitance and characteristic impedance of line.
5. Write short note on
   a. RFID
   b. Power Divider
   c. Planar Antenna.

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B.Tech. V-Sem. (Re Back) Examination, December - 2025
PCC/PEC Electronics and Communication Engineering
5EC 5-12 Embedded Systems

Time : 2 Hours **Maximum Marks : 80**

Min. Passing Marks : 28

Instructions to Candidates:

Attempt all Five questions from Part A, Four questions out of Six questions from Part B and Two questions out of Three questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No. 205).

PART - A

(Answer should be given up to 25 words only)

All questions are Compulsory. **(5×2=10)**

1. Define embedded system.
2. List key characteristics of embedded systems.
3. What is the function of embedded microcontroller cores?
4. Differentiate between embedded and general-purpose computing systems.
5. Define Real-Time Operating System (RTOS).

PART - B

(Analytical / Problem Solving Questions)

Attempt any Four questions. **(4×10=40)**

1. Draw and explain the block diagram of a simple microcontroller-based embedded system.
2. Describe different types of memories used in embedded systems.
3. Discuss how sensors and actuators are used in embedded systems.
4. Explain the difference between hardware and software in embedded systems with examples.

5. Explain interfacing of analog and digital blocks in embedded systems with neat diagrams.
6. Explain the design flow of embedded systems. Discuss hardware and software co-design issues.

PART - C

(Descriptive / Analytical / Problem Solving / Design Questions)

Attempt any Two questions. **(2×15=30)**

1. Design a block diagram of a temperature control embedded system using sensors, ADC, and microcontroller. Explain each block.
2. What is subsystem and user interfacing? Explain with neat diagrams.
3. Analyze the thermal and power trade-offs in designing an automotive embedded controller. Discuss their effect on hardware and software selection.
