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B.Tech. V-Sem. (Main/Back) Exam. - 2024

Electronics and Communication Engineering

5EC3-01 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)

1. ..... 2. .....

PART-A **[10×2=20]**

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. What is Cache Memory?

Q.2. Explain the input out-put processor.

Q.3. Define Computer Architecture.

Q.4. What is Von-Neuman Architecture? Define.

Q.5. Differentiate between RAM and ROM.

Q.6. What is Virtual Memory?

Q.7. Mention the various phases in executing an instruction.

Q.8. How overflow occurs in subtraction?

Q.9. Distinguish pipelining from parallelism.

Q.10. Define segmentation.

PART-B [5x4=20]

(Analytical/Problem-Solving Questions)

Attempt any five questions

Q.1. Explain Flynn's classification of parallel processing with necessary diagram.

Q.2. Is there any difference between RISC and CISC computers? Explain.

Q.3. What are addressing modes? Explain each in brief with diagram.

Q.4. Describe in detail about the bus arbitration techniques in DMA.

Q.5. Describe the procedure for addition and subtraction for fixed point number. Explain with the help of diagram.

Q.6. Explain the concept of pipeline in detail.

Q.7. How can we improve the performance of Cache Memory?

PART-C [3x10=30]

(Descriptive/Analytical/Problem-Solving/Design questions)

Attempt any three questions

Q.1. An address space is specified by 24 units and the corresponding memory space by 16 bits :

(i) How many words are there in the address space?

(ii) How many words are there in memory space?

(iii) If a page consists of 2k words, how many pages and blocks are there in the system?

Q.2. Explain the following terms with reference to non Von-Neumann Machines :

(i) SISD

(ii) SIMD

(iii) MISD

(iv) MIMD

Q.3. Describe various instruction formats and illustrate the same with example.

Q.4. Explain with an example about the operations and operands of the computer hardware.

Q.5. Write the short notes on the following :

(i) Parallel Processing

(ii) Microprogrammed computers

(iii) Associative Memory

(iv) Stacks and Queues

(v) Subroutines

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Total No. of Questions : 22 Total No. of Pages : 04

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B.Tech. V-Sem. (Main/Back) Exam. - 2024

ELECTRONICS & COMMUNICATION ENGG.

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)

1. .....NIL.....

2. .....NIL.....

PART-A **[10×2=20]**

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. Define Rectangular Waveguide.

Q.2. What do you mean by VSWR?

Q.3. Define Phase Velocity.

Q.4. What are the basic laws of electromagnetics?

Q.5. If the cut-off frequency of an air-filled waveguide is 10 GHz and support TE_{01} mode then what is its size.

Q.6. What do you mean by monopole and dipole antenna?

Q.7. Define the radiation resistance of an antenna.

Q.8. Write the name of two impedance matching techniques used in Transmission lines.

Q.9. What is the centre of constant VSWR circle in Smith?

Q.10. Write the unit of Poynting vector.

PART-B [5x4=20]

(Analytical/Problem-solving questions)

Attempt any five questions

Q.1. Why TEM mode is not possible inside waveguide explain the reasons support with Maxwell's equations?

Q.2. Explain any four antenna parameter and also write their units.

Q.3. State the radiation properties of an isotropic radiator.

Q.4. Distinguish between near and far fields of a Hertzian dipole. State their properties.

Q.5. Design a single stub of a Transmission line which is terminated with a load of 20+j50 ohm and has characteristic impedance $Z_0 = 100$ ohm. Assume the signal frequency is 100 MHz.

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Q.6. Explain Maxwell's equations in various forms.

Q.7. Explain transmission lines and their applications.

PART-C [3x10=30]

(Descriptive/Analytical/Problem-Solving/Design Questions)

Attempt any three questions

Q.1. Explain the following :

(a) How microstrip lines are better than waveguides at and above 60 GHz?

(b) How waveguides are better than microstrip lines between 1 to 30 GHz?

Q.2. Explain wave propagation in conducting medium and derive expression for phase and group velocity.

Q.3. Explain the radiation solution for potential function.

Q.4. Explain differnt type of waveguides briefly.

Q.5. Explain Smith Chart with diagram. Also explain applications of Smith Chart.

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Total No. of Questions : 22 Total No. of Pages : 04

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B.Tech. V-Sem. (Main/Back) Exam. - 2024

ELECTRONICS AND COMMUNICATION ENGINEERING

5EC 4-03 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)

1. Graph 2. Semilog graph

PART-A [10x2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. What is synchro?

Q.2. Write the Laplase transform of :

$X(t) = t^2 e^{-3t} U(t)$

Q.3. Find the order and type of the unity feedback system whose transfer function is given as :

$$G(s) = \frac{100(s+2)(s+10)}{s^4(s+10)(s^3+2s^2+5s+100)}$$

Q.4. Classify the control system on the basis of damping ratio.

Q.5. List any two applications of Root Locus.

Q.6. Draw the polar plot for function :

$$G(s) = \frac{1}{s^3(s+1)} \quad H(s) = 1$$

Q.7. What is feed forward control configuration?

Q.8. Explain Nyquist stability criterion.

Q.9. Draw electrical lag network and its pole zero plot.

Q.10. What is all pass system? Also write its application.

PART-B [5x4=20]

(Analytical/Problem solving Questions)

Attempt any five questions.

Q.1. Derive the transfer function of electrical network as shown in Figure 1

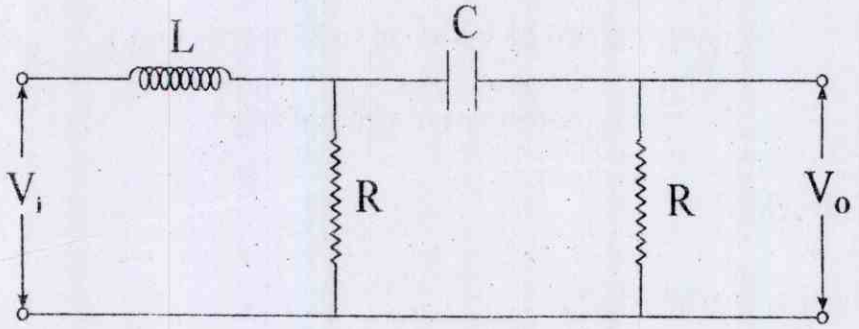

Figure 1

Q.2 What is the closed loop transfer function of system with positive feedback? Explain its effect on stability.

Q.3. State the difference between pneumatic actuator and pneumatic valve.

Q.4. The step response of second order underdamped system is given by :

$$C(t) = 1 - e^{-2t}\cos 5t + \frac{1}{\sqrt{3}} e^{-2t}\sin 5t$$

Find rise time and peak time of system.

Q 5. The unit feedback control system transfer function is given by following equation:

$$G(s)H(s) = \frac{K}{s(s^2 + 2s + 5)}$$

Determine the gain K such that the gain margin is 6db. Also determine the value of phase margin for the value of K obtained as above.

Q.6. Obtain STM for the state model whose matrix A is given by :

$$A = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix}$$

Q.7. What is the need of compensation in control system? Compare lag lead and lead lag network in detail.

PART-C

[3x10=30]

(Descriptive/Analytical/Problem-Solving/Design Question)

Attempt any three questions

Q1. Obtain the overall transfer function C/R from the signal flow graph as shown in figure 2 :

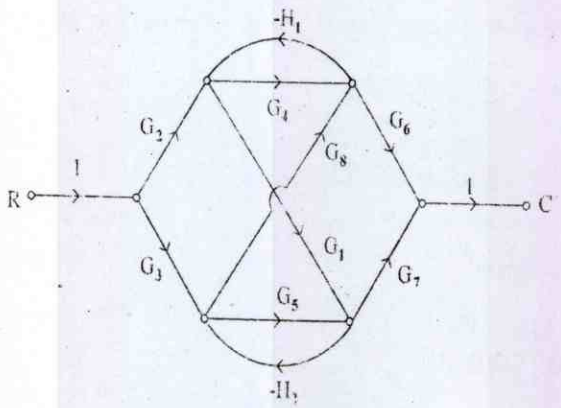

Figure 2

Q.2 The open loop transfer function of a unity feedback control system is

$$G(S) = \frac{K}{S(1+ST)}$$

By what factor the gain K should be multiplied so that damping ratio increased from 0.3 to 0.69 ?

Q.3 A unit feedback system is described by :

$$G(S)\,H(S) = \frac{10}{S(1+0.2S)(1+0.01S)}$$

Construct a Bode plot and find :

(a) Gain and Phase crossover frequency

(b) Gain and Phase margin

(c) Stability of closed loop system

Q.4 Given the unity feedback system, make a accurate plot of the root locus for the following system :

$$G(S) = \frac{K^2(S^2 - 2S + 2}{(S+1)(S+2)}$$

Calibrate the gain for at least four points. Also find the breakaways points, the jw axis crossing and range of gain for stability. Find angle of arrival also.

Q. 5. Write short notes on the following :

(a) Optimal control

(b) Non-linear control

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B.Tech. V-Sem. (Main/Back) Exam. - 2024

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 the following supporting material is permitted during examination. (Mentioned in Form No. 205)

1. ..... 2. .....

PART-A [10x2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. What do you understand by the terms signal and digital signal processing?

Q.2. What are the classifications of signals?

Q.3. Differentiate between Continuous time and discrete time signals.

Q.4. Write the advantages, disadvantages and limitations of DSP.

Q.5. Describe an LTI system.

Q.6. Distinguish between DFT and DTFT.

Q.7. Define N-point DFT of a sequence X(n).

Q.8. What are the properties of ROC?

Q.9. Give any two properties of Butterworth low pass filter.

Q.10. Define the Recursive and non-recursive systems.

PART-B [5x4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1. Determine x(n) = u(n) is a power signal or an energy signal.

Q.2 Check if the system Y(n) = ax(n)+b if is linear. What is meant by spectral density?

Q.3. Determine the inverse z-transform of the following z-domain functions :

(a) $x(z) = \dfrac{3z^2 + 2z + 1}{z^2 - 3z + 2}$

(b) $x(z) = \dfrac{z - 0.4}{z^2 + z + 2}$

Q.4. Compute 8-point DFT of the given sequence x(n) = {1,2,1,2,1,2,1,2} using DIF FFT algorithm.

Q 5. Find IDFT of an sequence X(K) = {2, 2, –3j, 4, 2, +3j}

Q.6. Define parametric and non-Parametric spectral estimation in detail.

Q.7. Compare DIT and DIF FFT algorithms.

PART-C [3x10=30]

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any three questions

Q1. Define the z-tranform and ROC of the following finite duration signals :

(a) $x(n) = \{3, 2, 2, 3, 5, 0, 1\}$

(b) $x(n) = \delta\{n-k\}$

Q.2 Write the necessary conditions to define stability in ROC. Also list out the methods to find inverse z-transform.

Q.3 Give the magnitude function of butterworth filter? What is the effect of variying order of N on magnitude and phase response?

Q.4 Calculate the DFT fo the sequence :

$$x(n) = \left(\frac{1}{4}\right)^n \text{ for N = 16}$$

Q. 5. Write short notes on the following :

(a) Applications of DSP

(b) Circular convolution

(c) Parsavel's relation for DFT

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Total No. of Questions : 22 Total No. of Pages : 04

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B.Tech. V-Sem. (Main/Back) Exam. - 2024

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)

1. NIL 2. NIL

PART-A [10x2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. Write down the applications of microwaves.

Q.2. List out the differences between the TE mode and TM mode.

Q.3. What is a phase shifter?

Q.4. Why are the S-parameters used in microwaves?

Q.5. What is slow wave structure?

Q.6. What is Gunn effect?

Q.7. What are the applications of MMICs?

Q.8. What is VSWR?

Q.9. Describe various radar applications.

Q.10. What is RFID and GPS?

PART-B [5x4=20]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1. Explain the stripline and microstripline.

Q.2 An air-filled rectangular waveguide has dimensions : a = 6 cm and b = 4cm. The signal frequency iS 4 GHz. Compute the cut-off frequency for the TE_{10} and TM_{11} modes.

Q.3. What is Magic associated with a Magic Tee? Draw a neat sketch of a Magic Tee and list out its applications and properties.

Q.4. Derive the S-matrix for an ideal 3 dB directional coupler.

Q 5. Derive the equation of velocity modulation for a Two-Cavity Klystron amplifier.

Q.6. Explain the principle of operation of an IMPATT diode.

Q.7. Describe the microwave power measurement.

PART-C [3x10=30]

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions

Q.1. Derive the expression for cut-off frequency, phase constant and phase velocity of waves in a circular waveguide.

Q.2. Explain the working principle of 8-cavity cylindrical magnetron. Derive the Hartree anode voltage equation for linear magnetron.

Q.3. Explain the construction of the Gunn diode using RWH and two -valley theory. Also, explain several modes of operation and applications of Gunn diodes.

Q.4. Design a bandpass filter having a 0.5 dB equal-ripple response, with N=3. The center frequency is 5 GHz, the bandwidth is 10% and the impedence is 75Ω.

Q.5. Draw the block diagram of the radar and explain each block. Derive the radar range equation.

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B.Tech. V-Sem. (Main/Back) Exam. - 2024

Electronics and Communication Engineering

5EC 5-14 Satellite Communication (Elective-I)

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

Note : Attempt all 10 questions from Part-A, 05 questions out of 07 questions from Part-B and 03 questions out of 05 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 the following supporting material is permitted during examination. (Mentioned in Form No. 205)

1. ..... 2. .....

PART-A

*Answer should be given upto 25 words only. **All** questions are compulsory.*

Each question carries 02 marks.

[2×10=20]

Q.1. Write the four advantages of satellite communication.

Q.2. Calculate the time required for signal transmit from earth station to GEO satellite.

Q.3. Describe the application of MEO satellite.

Q.4. Why Uplink frequency is greater than downlink frequency in satellite communication?

Q.5. Name of the three axis use for satellit communication expressions.

Q.6. What is the importance of solar eclipse in satellite link design?

Q.7. What is the importance of LNA in satellite link design?

Q.8. List the components use in earth station of Satellite communication.

Q.9. Which device is use in satellite to maintain the communication frequency of signal?

Q.10. Define the types of gain and losses occur in satellite link design.

PART-B

Analytical / Problem solving questions. Attempt any 05 questions.
Each question carries 4 marks.

[5×4=20]

Q.1. What are the different orbits employed in satellite communication and what are their applications?

Q.2. For an earth station transmitter with an output power of 40 dBW (10000 W), a back off loss of 3 dB, a total branching and feeder loss of 3 dB and a transmit antenna gain of 40 dB, determine the EIRP.

Q.3. What are the methods of stabilizing a satellite in the orbit? What are the merits and demerits of each?

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Q.4. A quasi-GEO satellite is in a circular equatorial orbit close to geosynchronous altitude. The quasi-GEO satellite, howerer, does note have a period of one sidereal day; its orbital period is exactly 24 hour-one solar day. Calculate.

(i) The radius of the orbit

(ii) Is the satellite moving towards the east or towards the west?

Q.5. Explain the differente type of antennas use in satellite communication.

Q.6. Fine and explain the system noise temperature of receiver used in satellite communication.

Q.7. What is the need of modulation schemes in satellite communication? Explain the different types of modulation schemes use in satellite communication.

PART-C

Descriptive / Analytical / Problem solving / Design questions.

Attempt any three questions. Each question carries 10 marks.

[3×10=30]

Q.1. Explain the Altitude and Orbit Control System (AOCS) sub-systems used in satellite communication.

Q.2. Consider a earth station receiver at 4 GHz has following gains and noise temperatures;

$T_{in} = 60K, T_{RE} = 60K, TM = 600K, T_{IF} = 1200K$

$G_{RF} = 17dB, G_m = 0dB, G_{IF} = 25dB$

Calculate the system noise temperature.

Q.3. What is the importance of LNA and HPA in satellite communication? Describe different type of LNA and HPA use in SATCOM.

Q.4. An earth station employs a power amplifier providing an output power of 100 w and antenna of 5 meter diameter for both transmission and reception. The transmit frequency is 6.25 GHz and the receive frequency is 4.5 GHz. System noise temperature is 140 K. Find the EIRP and G/T ratio for this station.

Q.5. Compare FAMA, DAMA and TDMA multiple access technologies for satellite communication with neat diagram.

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B.Tech. V-Sem. (Re Back) Exam. - 2024

ESC Electronics and Comm. Engg.

5EC 3-01 / Computer Architecture

Time : 2 Hours Maximum Marks : 80

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 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)

1. ..... 2. .....

PART-A [5x2=10]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1 What is pipelining? List its uses.

Q.2 What is an instruction cycle?

Q.3 What are the rules for addition of floating point numbers?

Q.4 Compare DRAM and SRAM.

Q.5 Define virtual memory. Why is it useful?

PART-B [4x10=40]

(Analytical/Problem solving questions)

Attempt any four questions

Q.1 What is DMA? Explain the working of a DMA controller with the help of a neat diagram.

Q.2 Discuss the various Cache management schemes.

Q.3 Write a short note on arithmetic pipelining.

Q.4 Describe the various modes of data transfer from and to a computer.

Q.5 What is a Von Neuman architecture? Explain its components.

Q.6 Differentiate between RISC and CISC computers.

PART-C [2x15=30]

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any two questions

Q.1 What is an addressing mode? Explain all the different addressing modes with one example of each.

Q.2 Explain the following terms in detail:

(i) SISD

(ii) SIMD

(iii) MISD

(iv) MIMD

Q.3 Explain the different memory technologies.

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Total No. of Questions : 22 Total No. of Pages : 04

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B.Tech. V-Sem. (Re-Back) Exam. - 2024

Electronics & Comm. Engg.

5EC 4-02 / Electromagnetics Waves

Time : 3 Hours Maximum Marks : 120

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)

1. ..... 2. .....

PART-A **[10x2=20]**

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1 Define VSWR.

Q.2 Define Phase Velocity.

Q.3 What do you mean by matching of a transmission line?

Q.4 What do you mean by dominant mode?

Q.5 Define scalar and vector field with example.

Q.6 What do you mean by stube matching?

Q.7 Define beam width of an antenna.

Q.8 Explain Poynting theorem.

Q.9 Define the radiation resistance of an antenna.

Q.10 Find the curl of the following vector field:-P= $x^2 yza_x + xza_z$.

PART-B **[5x8=40]**

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 Why TEM mode is not possible inside the waveguide? Also explain, how TE and TM modes are excited in the rectangular waveguide.

Q.2 A thin dipole antenna is t/15 long. If its loss resistance is 1.5Ω, Find its radiation resistance and efficiency.

Q.3 What do you mean by boundary conditions? Explain with proper example.

Q.4 Calculate the radiation resistance of λ/100 m and λ/y monopole and half wave dipole antenna.

Q.5 Describe the smith chart and its application in analysis of transmission line.

Q.6 Derive and explain first Maxwell equation.

Q.7 What is Hertzian dipole? Write the relation between a current element and an electric dipole using suitable expression.

PART-C [4x15=60]

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any four questions

Q.1 Two extensive homogenous isotropic dielectric meets on plane Z=0. For Z>0, ε_{r1} =4 and for Z<0, ε_{r2} =3. A uniform electric field $E_1 = 5a_x - 2a_y + 3a_z$ kv/m exists for Z>0, Find

(a) E_2 for Z<0,

(b) The energy density in joule/m^3 in both dielectrics

Q.2 Explain the methods of an antenna radiation pattern measurements. Also explain working of a folded dipole antenna.

Q.3 Derive an expression for characteristics impedance Z_0, attenuation constant α, phase constant β, velocity of propagation v_p and wavelength λ of a transmission line in terms of primary constant.

Q.4 Find the relation of the following for rectangular waveguide in TE mode:

(a) Cut-of frequency

(b) Wavelenth in waveguide

(c) Phase constant and phase velocity in the waveguide

(d) Group velocity and wave impedance in the waveguide

Q.5 What are the different types of losses in transmission line. Explain.

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B.Tech. V-Sem. (Re-Back) Exam. - 2024

ELECTRONIC AND COMM. ENGG.

5EC 4-03 Control System

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

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 the following supporting material is permitted during examination. (Mentioned in Form No. 205)

1. ..... 2. .....

PART-A **[10x2=20]**

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1 What is a transfer function in control systems?

Q.2 Define a closed-loop control system.

Q.3 What is steady-state accuracy in feedback control systems?

Q.4 Define robustness in the context of control systems.

Q.5 Define the root locus method in control system design.

Q.6 What is a Bode plot and what information does it provide in control system analysis?

Q.7 Define controllability in control systems.

Q.8 What is Optimal Control?

Q.9 Define the regulator problem in optimal control.

Q.10 What is a state variable in the context of state space analysis?

PART-B **[5x8=40]**

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 Explain the concept of dead-time in control systems and its impact on system performance.

Q.2 Discuss common types of control hardware used in industrial applications and their functions.

Q.3 Explain the differences between proportional, integral, and derivative control actions in feedback systems.

Q.4 Discuss the Routh-Hurwitz stability criterion and its application in determining system stability.

Q.5 Explain the performance specifications in the time domain for second-order systems.

Q.6 Explain lead and lag compensation in control systems and their effects on system performance.

Q.7 Explain the concept of nonlinear control systems and their analysis.

PART-C **[4x15=60]**

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any four questions

Q.1 Describe the analysis process of a closed-loop control system using block diagrams and signal flow graphs.

Q.2 Consider a feedback control system with a transfer function given by:

$$G(s) = \frac{K}{s(s+2)}$$

where K is a gain factor.

1. Determine the range of Kk for which the closed-loop system remains stable.
2. Calculate the closed-loop transfer function T(s) T (s) for this system.
3. Find the poles of T(s)T(s) and analyze their locations to confirm stability

Q.3 Consider a second-order control system with a transfer function given by:

$$G(s) = \frac{4}{s^2 + 2s + 4}$$

A. Determine the damping ratio (ζ) and natural frequency (ω_n).

B. Calculate the rise time, peak time, maximum overshoot, and settling time when subjected to a unit step input.

Q.4 Consider a linear continuous-time system represented by the following equations:

$$\dot{x}(t) = Ax(t) + Bu(t)$$
$$y(t) = Cx(t) + Du(t)$$

Where

$$A = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix}, \quad B = \begin{bmatrix} 0 \\ 1 \end{bmatrix}, \quad C = \begin{bmatrix} 1 & 0 \end{bmatrix}, \quad D = 0$$

1. Determine if the system is controllable and observable.

2. Find the eigenvalues of matrix A and discuss their significance regarding stability.

Q.5 Consider a closed-loop control system with the following open-loop transfer function represented in a block diagram:

$$G(s) = \frac{10}{s(s+2)}$$

The feedback is negative and unity.

1. Draw the block diagram of the system and convert it into a signal flow graph (SFG).

2. Determine the overall transfer function of the closed-loop system using Mason's Gain Formula.

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5E1394

B.Tech. V-Sem. (Re-Back) Exam. - 2024

ELECTRONICS AND COMM. ENGG.

5EC 4-04 Digital Signal Processing

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

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)

1. ..... 2. .....

PART-A **[10x2=20]**

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. What is the Window Method in FIR Filter Design?

Q.2. Define the Park-McCiellanAlgorithm.

Q.3. What is the effect of finite register length in FIR filter design?

Q.4. Define parametric and non-parametric spectral estimation.

Q.5. Define ROC.

Q.6. What role does the Z-Transform play in analyzing discrete-time systems.

Q.7. What is the Fast Fourier Transform (FFT)?

Q.8. How are discrete-time signals different from continuous-time signals.

Q.9. What is a discrete-time signal, and how is it represented mathematically?

Q.10. Define Discrete Fourier Transform (DFT).

PART-B

[5x8=40]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1. Explain the properties of the Discrete Fourier Transform (DFT).

Q.2. How does the sampling theorem ensure accurate reconstruction of signals?

Q.3. How are discrete-time signals represented using the unit sample sequence.

Q.4. Describe the characteristics of Butterworth, Chebyshev, and Elliptic IIR filters.

Q.5. Explain how IIR filters can be designed for different filter types.

Q.6. Discuss the implications of finite word length effects on digital filters.

Q.7. Explain multirate signal processing and its applications.

PART-C **4x15=60]**

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any four questions

Q.1. What are the key differences between continuous-time and discrete-time complex exponentials?

Q.2. Discuss the significance of the Fast Fourier Transform (FFT) algorithm in digital signal processing.

Q.3. Explain the design process of FIR digital filters using the Window Method and compare it with Park-McClellan's method.

Q.4. A signal is sampled at a rate of 44.1 kHz and needs to be down sampled by a factor of 4 processing. Calculate the new sampling rate after down sampling and explain how this affects signal processing.

5. Given a discrete-time sequence defined by $x[n]=(0.5)^n u[n]$, where $u[n]$ is the unit step function :

(a) Calculate the Z-transform $X(z)$ of the sequence $x[n]$.

(b) Determine its region of convergence (ROC).

(c) Analyze whether this system is stable based on its ROC.

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5E1395

B.Tech. V-Sem. (Re-Back) Exam. - 2024

ELECTRONICS AND COMM. ENGG.

5EC 4-05 / Microwave Theory and Techniques

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

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)

1. ..... 2. .....

PART-A **[10x2=20]**

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. Discuss Microwave need and advantages.

Q.2. Describe the difference between isolator and circulator.

Q.3. Define TM mode for microwave transmission.

Q.4. Why TEM waves are not propagated through waveguides?

Q.5. What is need of Matching networks?

Q.6. Write the S-matrix of for a two-port network.

Q.7. Draw the energy band diagram of Gunn Diode.

Q.8. Write the application of PIN diode.

Q.9. Why we require to measure VSWR in microwave circuit?

Q.10. What is Strip Line? Explain.

PART-B **[5x8=40]**

(Analytical/Problem-Solving Questions)

Attempt any five questions

Q.1. Explain the Gunn effect. Mention various modes of Gunn diode and explain them in detail.

Q.2. Describe the losses associated with microwave transmission.

Q.3. A shunt impedance Z is connected across a transmission line with characteristics impedance Z_0. Find the S-matrix of the Junction.

Q.4. How amplification is achieved in TWT amplifier?

Q.5. Draw the block diagram of network analyzer and explain the function of each block.

Q.6. Explain the experimental set up for measurement of radiation pattern and beamwidth.

Q.7. How the Microwave measurements are different from low frequency measurements?.

PART-C **[4x15=60]**

(Descriptive/Analytical/Problem-Solving/Design questions)

Attempt any four questions

Q.1. Discuss an arrangement to measure low microwave power within 1 to 10mW range.

Q.2. Explain the velocity modulation and bunching process in two-cavity klystron and also derive the expression for bunching parameters.

Q.3. What are advantages and disadvantages of monolithic microwave ICs? A reciprocal two-port microwave has a VSWR of 1.5 and insertion loss of 2dB. Find the magnitude of S-parameters for the device.

Q.4. Describe the method of frequency and impedance measurement at microwave frequency.

Q.5. Explain the principle of operation of IMPATT diode with suitable diagram and write down the advantages and uses of it.

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B.Tech. V-Sem. (Re-Back) Exam. - 2024

PCC-PEC ELECTRONICS AND COMM. ENGG.

5EC 5-12 Embedded Systems

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

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 the following supporting material is permitted during examination. (Mentioned in Form No. 205)

1. ..... 2. .....

PART-A **[5x2=10]**

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. Write the name memories used in embedded system.

Q.2. What are the factors on which memory selection of embedded system depends?

Q.3. Draw the block diagram of design process of embedded system.

Q.4. What is Small Scale Embedded System? Explain with example.

Q.5. Write the name of tools for designing embedded software.

PART-B [4x10=40]

(Analytical/Problem solving questions)

Attempt any four questions

Q.1. What are Embedded System? Give the classification of embedded system.

Q.2. Explain briefly Embedded firmware development langauages.

Q.3. Explain Disassembler and decompiler and their role in embedded firmware development.

Q.4. How the Product Level Communication Interface (External Communication Interface) is essential for communication with various subsystems of Embedded system? Explain.

Q.5. Design fundamental issues in Hardware-software Co-design.

Q.6. Classify the embedded system based on generation with example.

PART-C [2x15=30]

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any two questions

Q.1. Write a short note on real time programming languages and operating system for embedded system.

Q.2. What are Embedded System? Explain Embedded system design process and briefly discuss application areas of embedded systems.

Q.3. Write a short note on design tradeoffs due to process compatibility and thermal consideration in Embedded system.

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5E5022

Total No. of Questions : 5 Total No. of Pages : 04

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5E5022

B.Tech. V-Sem. (Old Back) Exam. - 2024

ELECTRONIC INSTRUMENTATION AND CONTROL ENGINEERING

5E12A/ Linear Integrated Circuits

EC, EI

Time : 3 Hours **Maximum Marks : 80**

Instructions to Candidates :

Attempt **any five** questions, selecting **one** question from each unit. All questions carry **equal** marks.

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)

1. ..... 2. .....

UNIT-I

Q.1. (a) How slew rate can be controlled by external components in an OP-Amp ? Explain. [6]

(b) In a differential amplifier the performance is depends on emitter resistance R_E and it must be as high as possible, but passive resistance of High value is not possible in ICs. Give the different schemes for obtain a large value of

R_E electronically by active components. [10]

OR

Draw and explain the practical circuits used for measure following Op-Amp parameter : [16]

(i) Input offset voltage

(ii) Slew rate

(iii) Common mode rejection ratio (CMRR)

(iv) Bias current I_B

UNIT-II

Q.2. (a) Draw the circuit diagram and explain the working of a voltage controlled-oscillator. [8]

(b) Draw the Op-Amp circuits to obtain : [8]

(i) Precision full wave rectifier

(ii) Wein bridge oscillator with oscillation frequency 20 kHz

OR

(a) What is an Instrumentation Amplifier ? List all application for this. [8]

(b) Derive the frequency of oscillation for triangular wave generator, also explain its working principle by using suitable diagram. [8]

UNIT-III

Q.3. (a) Design a low pass first order Butterworth filter with cutoff frequency 40 kHz and Mid band gain of 10. [8]

(b) What is Switched Capacitor Filter ? Realize a low pass filter with such filter and Op-Amp. [8]

OR

(a) Design a high pass filter at a cutoff frequency of 1 kHz with pass band gain of 2. Also plot its frequency response. [8]

(b) Write down a short note on "Chebyshev filter design". [8]

UNIT-IV

Q.4. (a) Draw the circuit diagram of Monostable multivibrator using IC-555, also draw its waveform. [8]

(b) Draw and explain the working of a series regulator and how it can be improved? [8]

OR

Write short notes on the following :

(a) Schmitt trigger [8]

(b) A/D and D/A converters [8]

UNIT-V

Q.5. (a) Draw and explain the working of Anti-log amplifiers. [8]

(b) Define Lock range and Capture range of a PLL. Find their general expression. [8]

OR

(a) Draw circuit of FM detector using PLL and explain its working. [8]

(b) Explain FSK demodulator using PLL. [8]

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5E5023

B.Tech. V-Sem. (Old Back) Exam. - 2024

ELECTRONICS AND COMMUNICATION ENGG.

5EC3A/ Telecommunication Engineering

Time : 3 Hours Maximum Marks : 80

Instructions to Candidates :

Attempt **any five** questions, selecting **one** question from each unit. All questions carry **equal** marks. (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 the following supporting material is permitted during examination. (Mentioned in Form No. 205)

1. ..... 2. .....

UNIT-I

Q.1. (a) Show that an infinite transmission line is equivalent to a finite transmission line when it is terminated in its characteristics impedance. [8]

(b) What are the different types of losses in Transmission lines ? Explain them. [8]

OR

(a) Discuss the different types of Transmission lines and their applications. [8]

(b) Write a short note on VSWR in Transmission line. [8]

UNIT-II

Q.2. (a) What do you mean by Matching the Transmission line ? Explain the method of single and double stub matching with neat diagram. [8]

(b) Derive the relationship between Standing wave ratio and Reflection coefficient. [8]

OR

Discuss the measurement techniques for the following parameters in a Transmission line : [16]

(i) VSWR

(ii) Reflection coefficient

(iii) Power

UNIT-III

Q.3. (a) Describe the constant K-Filters. [8]

(b) Explain a symmetric lattice attenuator. Write its design equations in terms of characteristics impedance attenuation factor. [8]

OR

Distinguish between the following : [16]

(i) Balanced and Unbalanced Network

(ii) Image and Iterative impedance

UNIT-IV

Q.4. What are the functions and importance of Transmission Bridges ? What are the various types of transmission bridges used in telephony ? Describe each type and circuit diagram. [16]

OR

(a) Explain the following : [8]

(i) Traffic Limit

(ii) Busy Hour

(iii) Grade of Service

(b) With the help of neat diagram explain the working of Echo cancellers. [8]

UNIT-V

Q.5. (a) Explain EPABX telephone exchange. [8]

(b) Discuss the PCM switching approach. [8]

OR

Write short notes on **any two** of the following : [16]

(a) Signaling in telephone system

(b) STS and TST switching

(c) SPC digital phone exchange

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Total No. of Questions : 5 Total No. of Pages : 04

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5E5024

B.Tech. V-Sem. (Old Back) Exam. - 2024

ELECTRONICS AND COMMUNICATION ENGG.

5EC4A/ Analog Communication

Time : 3 Hours **Maximum Marks : 80**

Instructions to Candidates :

Attempt **any five** questions, selecting **one** question from each unit. **All** questions carry **equal** marks. (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 the following supporting material is permitted during examination. (Mentioned in Form No. 205)

1. ..... 2. .....

UNIT-I

Q.1. (a) Explain the shot noise and white noise in detail. What is partition noise ? [8]

(b) Explain using mathematical equation noise temperature and noise figure in communication system. [8]

OR

(a) Define and explain the term : "Noise equivalent bandwidth of a filter". [8]

(b) A low noise amplifier operates with a bandwidth of 500 MHz and a noise figure of 1.78 dB. Compute the equivalent Noise temperature and Noise figure. [8]

UNIT-II

Q.2. (a) Draw the block diagram of phase discriminator method of generating SSB signal. [8]

(b) State the advantages, disadvantages and application of AM. [8]

OR

(a) A carrier signal is sinusoidally modulated to a depth of m = 0.8. What percentage of the total power of the modulated signal is in two sidebands ? [8]

(b) Sketch and explain the typical spectrum of the VSB signal that is given as input to the video detector of a T.V. Receiver. [8]

UNIT-III

Q.3. (a) With a neat block diagram, briefly explain the principle of working of a superhetrodyne FM broadcast receiver. Why is a limiter stage used ? [8]

(b) Draw the phase diagram of narrow and wide band FM. [8]

OR

(a) Compare AM, FM and PM in respect of : [8]

(i) Bandwidth

(ii) Noise effects

(b) Define frequency and phase modulation and explain the relation between them. [8]

UNIT-IV

Q.4. (a) What is Threshold effect ? [4]

(b) How is an angle modulation system SNR is calculated ? [6]

(c) What are Internal noises in communication system ? Explain in detail. [6]

OR

(a) What is Pre-emphasis and De-emphasis ? How these are helpful in communication system ? [8]

(b) What is the model used for Envelope detector ? [8]

UNIT-V

Q.5. (a) Compare and tabulate Natural and Flat top Sampling. [8]

(b) How PWM signals are reconstructed at the receiver side ? [8]

OR

(a) Briefly explain the following : [8]

(i) Aliasing

(ii) Aperture effect

(iii) Zero order hold

(b) Compare PAM, PWM and PPM. [8]

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5E5025

B.Tech. V-Sem. (Old Back) Exam. - 2024

ELECTRONICS AND COMMUNICATION ENGG.

5EC5A/ Microwave Engineering - I

Time : 3 Hours Maximum Marks : 80

Instructions to Candidates :

Attempt **any five** questions, selecting **one** question from each unit. **All** questions carry **equal** marks. (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 the following supporting material is permitted during examination. (Mentioned in Form No. 205)

1. ..... 2. .....

UNIT-I

Q.1. (a) Draw the field patterns for Strip-lines and Microstrip lines. [8]

(b) Discuss the following in rectangular waveguide : [8]

(i) Degenerate mode

(ii) Dominant mode

OR

An air-filled rectangular waveguide of inside dimension 7 x 3.5 cm operate in the dominant TE_{10} mode. [16]

(i) Find the cutoff frequency.

(ii) Determine the phase velocity of the wave in the guide at a frequency of 3.5 GHz.

UNIT-II

Q.2. (a) Derive expressions that give the impedance parameters in terms of the ABCD parameter. [8]

(b) Discuss the following : [8]

(i) Reciprocal Network

(ii) Lossless Network

OR

Derive the following in terms of S-parameters when the ports are matched terminated in two port networks : [16]

(i) Return loss

(ii) Transmission loss

(iii) Insertion loss

(iv) Reflection loss

UNIT-III

Q.3. (a) What is the purpose of Directional couplers ? Explain the operation of a 4-port directional coupler. [8]

(b) Write s-matrix and explain the working of magic tees. [8]

OR

With the help of a diagram, explain the following microwave components : [16]

(i) Wilkinson Power Divider

(ii) Hybrid Ring

UNIT-IV

Q.4. (a) Describe the methods of Microwave power measurement. [8]

(b) Explain the measurement using network analyzer. [8]

OR

(a) Write short notes on Noise figure meter. [8]

(b) What is low VSWR ? Describe its measurement. [8]

UNIT-V

Q.5. (a) Write down the name of different substrates used for Microwave Integrated circuit and their properties. [8]

(b) Describe the Photolithographic process using diagram. [8]

OR

(a) Describe the MMIC techniques. [8]

(b) Discuss the capacitor-film development. [8]