5E1780

Total No. of Questions : 22

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5E1780

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.

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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.

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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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.

[5x4=20]

PART-B

(Analytical/Problem solving Questions)

Attempt any five questions.

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

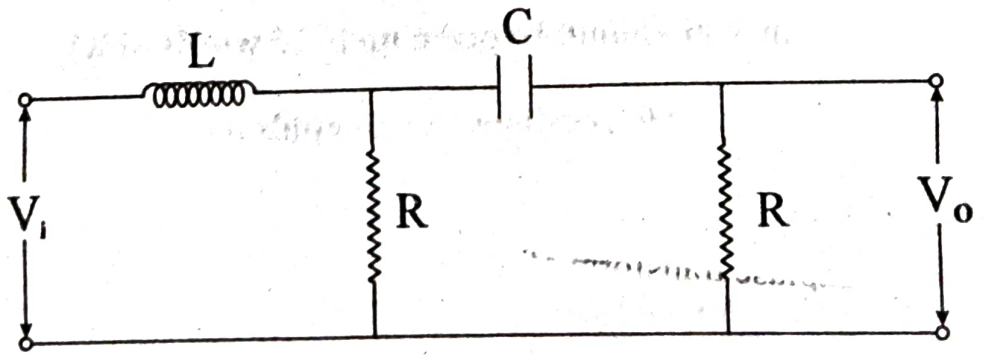

Figure 1

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.

[3x10=30]

PART-C

(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 :

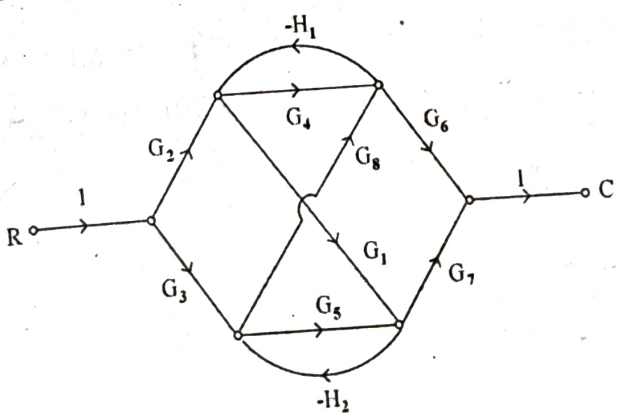

Figure 2

Q.2 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..

[3x10=30]

PART-C

(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 :

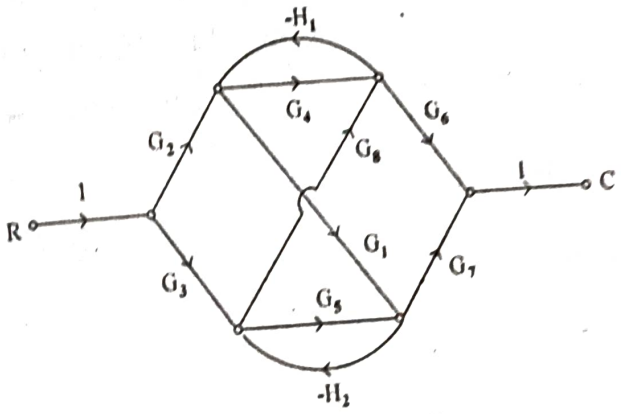

Figure 2

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

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

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 :

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

[P.T.O.]

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

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5E1784

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.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.

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

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

Explain the principle of operation of an IMPATT diode.

Describe the microwave power measurement.

PART-C [3x10=30]

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions

:rive the expression for cut-off frequency, phase constant and phase velocity of ves 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 & COMMUNICATION ENGINEERING

5EC 5-11 Bio-Medical Electronics (Elective-I)

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 [10x2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. What is human physiology, and why is it important in understanding the human body?

Q.2. How do force transducers work, and where are they used in medicine?

Q.3. What are biomedical transducers, and how are they used in healthcare?

Q.4. What methods do temperature transducers use to monitor body temperature?

Q.5. What are the bio-electrodes, and why are they important in biomedical applications?

Q.6. How are disposable bio-electrodes advantageous in medical diagnostics?

Q.7. What methods are used to measure blood pressure accurately?

Q.8. How does nuclear imaging differ from other imaging techniques?

Q. 9 What aids are available for the handicapped to improve mobility?

Q. 10. How do bio-electrodes and amplifiers enable brain activity monitoring in EEG?

[5x4=20]

PART-B

(Analytical/Problem solving questions)

Attempt any five questions

Q.1. With the help of a neat diagram, explain the principle of working of as Electromagnetic blood flowmeter.

Q.2 Explain the various transducers used in body temperature measurement.

Q.3. Draw and explain a neat schematic diagram of an EEG machine.

Q.4. Draw and explain the schematic diagram of an instrumentation amplifier used 10 in biomedical measurements.

Q 5. What is cardiac output? Explain any scheme for cardiac output measurement.

Q 6. Explain the need for a defibrillator and draw and explain the dc defibrillator.

Q.7. What are the requirements of a biological amplifier?

PART-C

[3x10=30]

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions

Q1. Define diathermy. Draw the circuit diagram of a short-wave diathermy unit and discuss its impact on therapy purpose in detail. Also briefly describe how it can be applied to human subjects.

2 What are known as biopotential electrodes? Draw its equivalent circuit. Explain various types of biopotential electrodes with a suitable diagram.

3 Design a suitable amplifier that can be used in the front end of an ECG machine. Justify your by specifying the features of the selected amplifier.

4 How pacemakers are classified based on the modes of operation? Draw the block diagram of stand by and demand pacemakers and explain its working principle.

Q. 5. Elucidate the detailed procedure to detect blood pressure using a Sphygmomanometer and ultrasonic method.

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

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5E1786

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

ELECTRONICS AND COMMUNICATION ENGINEERING

5EC5-12 Embedded Systems (Elective-I)

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 [10x2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. What is an embedded system?

Q.2. What is microcontroller? Name few microcontrollers used in embedded systems.

Q.3. What is the selection criterion for microcontrollers used in embedded system?

Q.4. What the use of watchdog timer in an embedded system?

Q.5. Name all the important parts used to make a complete usable embedded system.

Q.6. Write about embedded software requirements.

Q.7. What is meant by Real Time Clock?

Q.8. Why do you need multiple actions and multiple controlling tasks for devices in an embedded system? Explain, using microwave oven as an embedded system.

Q.9 Name few challenges faced in designing an embedded system.

Q.10. Describe about the operating system used in embedded system.

[5x4=20]

PART-B

(Analytical/Problem solving questions)

Attempt any five questions

Q.1. Explain technological aspects of input/output ports and circuits in embedded systems.

Q.2 Describe about the interfacing between analog and digital blocks of an embedded system.

Q.3. Describe about Real time operating system in embedded system.

Q.4. What is scheduling? Explain few methods of scheduling used in embedded system.

Q.5. How are digital signal processors different from processors used in embedded system?

Q.6. Write about Timing and Counting devices used in embedded systems.

Q.7. Write a note on 8051architectures.

[3x10=30]

PART-C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions

Q.1. Describe in detail few applications of embedded systems.

Q.2 Explain in detail about serial communication in embedded systems.

Q.3 Explain the interrupts and interrupt handling mechanisms in embedded systems.

Q.4 Explain Device, File and IO subsystem management RTOS operating system.

Q.5. Write about inter-process communication, synchronization of processes, Threads and Tasks in embedded systems.

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