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5E1391

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

5E1391

B.Tech. V- Semester (Main) Examination, Nov. - 2019
ESC Electronics & Comm. Engg.
5EC 3-01 Computer Architecture

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** 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.

PART - A

(Answer should be given up to **25** words only)

All questions are **compulsory** **(5×2=10)**

1. What is Von - Neuman Architecture?
2. What do you mean by computer structure?
3. What is virtual memory.
4. Mention the various phases in executing an instruction.
5. Write the rules to perform addition an floating point number.

PART - B

(Analytical/Problem solving questions)

Attempt any **four** questions **(4×10=40)**

1. What is cache memory. How to improve cache performance? Discuss.
2. Explain the pipelining in detail.
3. Explain in detail about the bus Arbitration techniques in DMA.
4. What is the use of DMA controller.
5. What are the addressing modes Explain each in brief with diagram.
6. Explain flynn's classification of parallel processing with necessary diagram.

PART - C

(Descriptive/Analytical/Problem Solving/Design Question)

Attempt any two questions (2×15=30)

1. Explain various instruction formats and illustrate the same with an example.
2. Explain with an example about the operations and operands of the computer hardware?
3. Explain in detail about the memory technologies?

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5E1392

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

5E1392

B.Tech. V- Semester (Main) Examination, Nov. - 2019
PCC/PEC Electronics & Comm. Engg.
5EC 4-02 Electromagnetics Waves

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

Instructions to Candidates:

*Attempt **all ten** questions from **Part A**, **five** questions out of **eight** from **Part B** and **Four** questions out of **seven** 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.

Part - A

(Answer should be given up to **25** words only)

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

1. If the cutoff frequency of an air-filled waveguide is 10 GHz and support TE_{01} mode then what is its size?
2. Write the name of two impedance matching techniques used in Transmission lines.
3. Write the unit of pointing vector.
4. If cutoff frequency of TE_{11} mode is 5 GHz then find the operating frequency of TE_{23} mode.
5. If the length of a transmission line is less than $\lambda/4$ then draw its electrical equivalent circuit.
6. Write the Maxwell equation in differential form for electric field which determine the pattern of electric flux line.
7. Define the radiation resistance of an antenna.
8. What is the center of constant VSWR circle in Smith?
9. If the group velocity is 0.9×10^3 m/s then find the corresponding phase velocity.
10. Write the general expression of waveguide impedance when TM mode propagating inside waveguide.

PART - B

(Analytical/Problem solving questions)

Attempt any **five** questions **(5×8=40)**

1. The cross section of a rectangular waveguide is 20×40 cm^2 then find the operating frequency of

   a) TE_{02} and

   b) TE_{32} mode.

2. Why TEM mode is not possible inside waveguide explain the reasons supporting with Maxwell's equations.

3. Explain any four antenna parameter and also write their units.

4. Define the characteristic impedance of a Transmission line and find its value at 50MHz. Assume the line primary parameters per unit length are R = 0.2 ohm, L = 0.2 Nanohenery, C = 0.5 nanofarad and G =10 Mho.

5. Draw the 2D and 3D radiation pattern of a dipole and mono pole antenna.

6. 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.

7. Explain boundary conditions of electric and magnetic field. How these conditions are used?

8. Draw the electric and magnetic field pattern inside a waveguide at

   a) TE_{10} and

   b) TM_{21}.

PART - C

(Descriptive/Analytical/Problem Solving/Design Questions)

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

1. Find the expression of input impedance of a Transmission line in terms of its characteristic impedance, load impedance and length of the line. Also find the value of it when the line length is

   a) $l = 2\lambda$ and Z_L = 0 ohm and

   b) $l = \lambda/4$ and $Z_L = Z_0$.

2. How EM signal radiated from a conductor? What are the conditions for it? Define the far field and near field around a radiating current element. Also find the interrelation between these two fields.

3. Explain the working of rectangular waveguide. What is the frequency range where these waveguide are most suitable? Find the minimum cutoff frequency of a waveguide, also find it for a waveguide whose cross section is $25 \times 50 cm^2$.

4. Explain the different losses in Transmission line and compare them

   a) in different type of Transmission line and

   b) at different frequency.

   How these losses can be reduced?

5. Define the reflection and transmission coefficient and find their value in following cases :

   a) A Transmission line (with $Z_0 = 100$) terminated with $Z_L = 200 + j\,10$

   b) A Transmission line (with $Z_0 = 100$) terminated with $Z_L = j\,100$

   c) A Transmission line (with $Z_0 = 100$) terminated with open circuit

6. Write all Maxwell equations in integral form for a dynamic EM field for vacuum and a lossy medium. Using these also develop the EM wave equation find prove that in vacuum the Wave are Transverse in nature.

7. Explain

   a) How microstrip lines are better than Waveguide at and above 60 GHz

   b) How Waveguides are better than microstrip lines between 1 to 30 GHz.

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5E1393

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

5E1393

B.Tech V- Semester (Main) Examination Nov. - 2019
PCC/PEC Electronics & Comm. Engg.
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 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).

Part - A

(Answer should be given up to 25 words only)

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

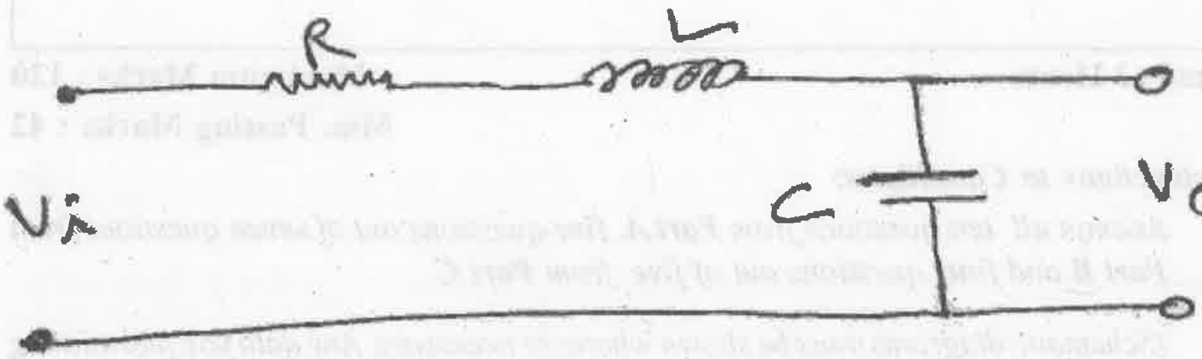
1. What is LVDT?
2. What is unity feedback closed loop control system?
3. Explain rise time and settling time.
4. Explain observability.
5. What is meant by optimal control?
6. What is lag compensation?
7. Explain relative stability.
8. What are type-I and type-II systems?
9. What is meant by feed forward control?
10. What is steady state error?

Part - B

(Analytical/Problem Solving questions)

Attempt any **five** questions **(5×8=40)**

1. Draw the block diagram of series RLC circuit, where v_i and v_0 are the input and output voltages.



2. Draw the signal flow graph of following set of equations:

$$x_2 = x_1 + ax_5$$
$$x_3 = bx_2 + cx_4$$
$$x_4 = dx_2 + ex_3$$
$$x_5 = fx_4 + gx_3$$
$$x_6 = x_5$$

3. When a second order control system is subjected to a unit step input, the values of $s = 0.5 \; and \; w_n = 6 \; rad/\sec$. Determine the rise time, peak time, settling time and peak overshoot.

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

5. Consider the unity feedback control system, whose open loop transfer function is $G(s) = \frac{1+as}{s^2}$. Determine the value of a , so that the phase margin is 45.

6. Consider the following system and check its controllability and observability:

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} -0.5 & 0 \\ 0 & -2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(t)$$

$$y(t) = \begin{bmatrix} 0 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

7. For the given transfer function, obtain the state model:

$$G(s)=\frac{k}{s^3+a_3s^2+a_2s+a_1}$$

Part - C

(Descriptive/Analytical/Problem Solving/Design Question)

Attempt any **four** questions **(4×15=60)**

1. The open loop transfer function of a unity feedback system is given by

$$G(s)=\frac{K}{s(1+sT)}$$

Where, K and T are constants. By what factor the amplifier gain be reduced so that the peak overshoot, of unit step response of the system is reduced from 75% to 25%.

2. The characteristic equation of feedback control system is

$$s^4+20s^3+15s^2+2s+K=0$$

a) Determine the range of K for the system to be stable.

b) Can the system be marginally stable? If so find the required value of K and frequency of sustained oscillation.

3. For the following system, find its state, output equation and express it in matrix form

$$\frac{y(s)}{u(s)}=\frac{20(4s+2)}{s^3+5s^2+8s+2}$$

4. Investigate the stability by the Routh stability criterion for the following characteristic equation

$$s^5+s^4+2s^3+2s^2+3s+5=0$$

5. The open loop transfer function of a unity feedback system is given by:

$$G(s)=\frac{K}{s(1+sT)}$$

By what factor, the amplifier gain K should be multiplied so that the damping ratio is increased from 0.3 to 0.9

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5E1394

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

5E1394

B.Tech V- Semester (Main) Examination Nov. - 2019
PCC/PEC Electronics And Comm.Engg.
5EC 4-04 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** from **Part B** and **four** questions out of **five** 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).

PART - A

(Answer should be given up to 25 words only)

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

1. Find z-transform of $x[n]=2^n . u(n-2)$ [2]
2. Explain the shift property of z-transform. [2]
3. Why linear convolution is important in digital signal processing? [2]
4. If DFT of $x[n]$ is $X(k)$, then find DFT of $\{x(n+m)_N\}$ [2]
5. Write symmetry property and Periodicity property of the phase factor W_N [2]
6. Draw Direct form-II realization for the following system $H(z)=\frac{1-2z^{-1}}{1+5z^{-1}}$ [2]
7. For the FIR digital filter $H(e^{jw})=(0.7+0.6\cos w-0.9\cos 2w)e^{-j7w}$. Determine the phase and group delay. [2]
8. Write advantages of the FIR filters? [2]
9. Write Analog frequency transformation relation for low pass to low pass and low pass to high pass transformation [2]
10. Explain sign-magnitude format of fixed point representation. [2]

PART - B

(Analytical/Problem solving questions)

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

1. Obtain the cascade realisation of the system characterized by the transfer function.

$$H(z)=\frac{2(z+2)}{z(z-1)(z+5)(z+4)}$$ **[8]**

2. Find the 4-point DFT of the sequence $x(n)=\cos\frac{n\pi}{4}$ **[8]**

3. Given $x(n)=\{0,1,2,3\}$, find $X(k)$. Using DIT FFT algorithm. **[8]**

4. The output $y(n)$ for an LTI system to the input $x(n)$ is $y(n)=x(n)-2x(n-1)+x(n-2)$ compute and sketch the magnitude response of system for $0 \le w \le 2\pi$ **[8]**

5. Calculate the order of the Butter warm digital filter for the following specifications: (Use bilinear transformation)

   Pass band frequency $w_p = 0.2\pi$

   Stop band frequency $w_s = 0.3\pi$

   Pass band ripple $S_p = 0.89$

   Stop band ripple $S_s = 0.18$

   Also calculate the 3dB cut-off frequency of the above designed filter. **[8]**

6. Discuss briefly multi-rate signal processing by Decimator and interpolator. **[8]**

7. Discuss Rounding off and Truncation errors in sign magnitude representation. **[8]**

Part - C

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any four questions **(4×15=60)**

1. Design a FIR filter with using Hamming window with M = 7

$$H_d\left(e^{-jw}\right)=\begin{cases} e^{-j3w}, & -\frac{\pi}{4} \le w \le \pi/4 \\ 0, & \frac{\pi}{4} \le |w| \le \pi \end{cases}$$

[15]

2. Given $x(n) = n+1$ and $N = 8$, find $X(k)$ using DIF FFT algorithm **[15]**

3. Discuss the application of DSP in the speech analysis and speech synthesis systems. Draw the suitable representation diagrams also to explain the processes. **[15]**

4. Prove the following properties with suitable mathematical expressions

   a) Differentiation property in z-transform

   b) Circular frequency shift DFT

   c) Parseval's theorem in DFT to represent the energy in the finite duration sequence $x(n)$ **[15]**

5. Calculate circular periodic convolution of the following two sequences by using DFT and IDFT Property. **[15]**

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

5E1395

B.Tech. V- Semester (Main) Examination, Nov. 2019
PCC/PEC Electronics and Comm. Engg.
5EC 4-05 Microwave Theory and 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** from **Part B** and **Four** questions out of **Five** 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.

PART - A

(Answer should be given up to **25** words only)

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

1. Define microwave.
2. Define TE mode for microwave transmission.
3. Draw the microstrip line structure.
4. Write down the S - matrix for a two port network.
5. Define coupling factor of a directional coupler.
6. Draw the energy band diagram of a Gunn diode.
7. Define transducer power gain for microwave amplifier.
8. Why do we require measuring VSWR in a microwave circuit?
9. Write down use of Network Analyzer.
10. What do you understand by monolithic microwave integrated circuits.

PART - B

(Analytical/Problem solving questions)

Attempt any **five** questions (5×8=40)

1. Describe the losses associated with microwave transmission.

2. A microstrip line is to be designed and its specification is strip thickness $t \leq 0.005h$; substrate board is alumina; relative dielectric constant $\epsilon_r = 10$; ratio of w/h = 0.95; Calculate

a) effective relative dielectric constant

b) characteristics impedance Z_0.

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

4. Prove that it is impossible to construct a perfectly matched, lossless, reciprocal three - port junction.

5. Explain in detail the analytic approach to optimum oscillator design using S - Parameters.

6. Explain the experimental set - up for measurement of radiation pattern and beam width.

7. Draw the block diagram of a basic radar and explain how it works.

PART - C

(Descriptive/Analytical/Problem Solving/Design Questions)

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

1. The S - parameters of a two - port network are given by

$S_{11} = 0.2\angle 0,\ S_{22} = 0.1\angle 0$

$S_{12} = 0.6\angle 90^0,\ S_{21} = 0.6\angle 90^0$

a) Prove that the network is reciprocal but not lossless.

b) Find the return loss at port 1 when port 2 is short circuited.

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

3. Design a low - pass, maximally flat lumped - element fitter having a passband of 0-2 GHz, and an attenuation of at least 20dB at 3.4 GHz. The characteristics impedance is $50\,\Omega$.

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

5. a) Describe the process involved in fabrication of MMICs.

b) Write down the medical and civil applications with suitable diagram of microwaves.

c) Write short notes on microwave imaging.

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5E1396

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

5E1396

B.Tech. V Semester (Main) Examination, Nov. - 2019
PCC/PEC Electronics and Comm. Engg.
5EC 5-11 Bio - Medical Electronics

Time : 3 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** 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.

PART - A

(Answer should be given up to **25** words only)

All questions are **compulsory** **(5×2=10)**

1. Define Bio Potentials. **(2)**
2. Explain the electrode theory? **(2)**
3. What is electrocardiogram? **(2)**
4. What do you mean by 'plethysmography'? **(2)**
5. What are the basic biotelemetry system. **(2)**

PART - B

(Analytical/Problem solving questions)

Attempt any **four** questions **(4×10=40)**

1. Explain the various selection criteria for selecting the transducers for the biomedical applications. List the transducers also. **(10)**
2. Draw and explain the diagram of ultrasonic blood flow measurement. **(10)**
3. Explain micro and macro shock? Discuss various safety measures. **(10)**
4. What is the need of Pacemakers? Explain any one synchronous pacemaker in detail. **(10)**

5. Define 'fibrillation' term. Explain capacitive discharge type DC Defibrillator. **(10)**

6. What is meant by 'EEG'? Discuss various steep patterns associated with it. **(10)**

PART - C

(Descriptive/Analytical/Problem Solving/Design Question)

Attempt any **two** questions **(2×15=30)**

1. Explain the functioning of Heart Lung machine by suitable diagrams, merits, demerits and applications. **(15)**

2. Draw and explain the scheme for the measurement of concentration of O_2 in blood. What are the basic components of an MRI imaging system? Explain function of each component in brief. **(15)**

3. Explain the working with the help of block diagram for monitoring the arterial blood pressure. How are the potentials in muscle fibers measured and what is the record called that is obtained there form. **(15)**