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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

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

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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)**

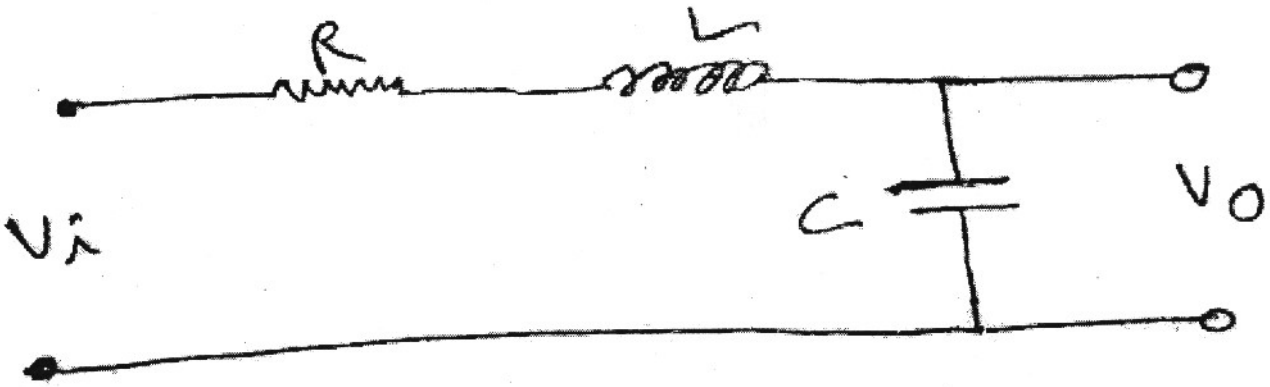
1. What is LVDT?
2. What is unity feedback closed loop control system?
3. Explain rise time and settling time.
4. Explain observability.
5. What is meant by optimal control?
6. What is lag compensation?
7. Explain relative stability.
8. What are type-I and type-II systems?
9. What is meant by feed forward 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 $G(s) = \dfrac{1}{s(s+1)}$

5. Consider the unity feedback control system, whose open loop transfer function is $G(s) = \dfrac{1+as}{s^2}$. 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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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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5E1395

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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

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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)**

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5E1388

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5E1388

B.Tech. V- Semester (Main) Examination, Nov. - 2019
PCC/PEC Electronics Engg.
5EC 5-13 Probability Theory And Stochastic Process
(Common for EC, EIC)

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

1. State the theorem of total probability.

2. Define Tchebycheff Inequality.

3. If the joint pdf of (X,Y) is given by f(x,y) = 24 y (1-x), $0 \le y \le x \le 1$, find E (XY).

4. A continuous random variable 'X' has a pdf $f(x) = kx^2e^{-x}; x > 0$. Find 'k' and Mean.

5. If at least child in a family with 2 children is a boy, what is the probability that both children are boys?

PART - B

(Analytical/Problem solving questions)

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

1. If the WSS process {X(t)} is given by $X(t) = 10\cos(100t + \theta)$, where '$\theta$' is uniformly distributed over $(-\pi, \pi)$, prove that {X(t)} is correlation ergodic.

2. Find the MGF of Poisson and Exponential distribution.

3. Let X and Y be define by $X = \text{Cos}\,\theta$ and $Y = \text{Sin}\,\theta$, Where θ is a random variable uniformly distributed over $[0, 2\pi]$. Show that X and Y are uncorrelated and not independent.

4. Write the central limit theorem for a sequence of large number random variables and explain.

5. The no. of monthly breakdowns of a compute is a RV having a Poisson's distributions with mean equal to 1.8. Find the probability that this compute will function for a month

   i) without a breakdown

   ii) with only one break down and with at least one breakdown.

6. Compute the coefficient of correlation between X and Y using the following data :

X :	5	10	15	20	25
Y :	16	19	23	26	30

PART - C

(Descriptive/Analytical/Problem Solving Questions)

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

1. a) The joint pdf of 'X' and 'Y' is given by $f_{xy} = xye^{-(x^2+y^2)/2}$ u(x)u(y). Find the marginal pdf's of X and Y.

   b) If two random variables X and Y are independent, find the pdf of Z = X/Y in terms of the density functions of X and Y.

2. a) Write the properties of Autocorrelation function and Power Spectral density.

   b) Find the probability that at most 6 defective torch will be found in a box of the 300 torches. If experience shows that 3% of such torches are defective.

3. Let Y(t) be the output of an LTI system with impulse response h(t), when a WSS random process X(t) is applied as input. Show that

   a) $S_{XY}(\omega) = S_{XX}(\omega)H^*(\omega)$

   b) $S_{YY}(\omega) = S_{XY}(\omega)|H(\omega)|^2$

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5E5021

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5E5021

B.Tech. V- Semester (Back) Examination, Nov. - 2019
Electronics And Comm. Engg.
5EC1A Signals and Systems
(Common For EC, EIC)

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

Min. Passing Marks : 26

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.*

Unit - I

1. For the following input output relationship determine whether the corresponding system is linear or not.

i) $y(t) = x^2(t)$ **(8)**

ii) $y(n) = 2x(n-3)$ **(8)**

(OR)

1. Distinguish between :

a) Continuous and discrete - time signals.

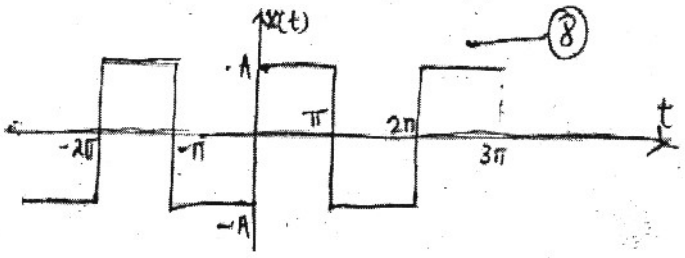
b) Stable and unstable systems.

c) Multichannel & Multidimensional signals.

d) Causal and Non - Causal systems. **(4+4+4+4=16)**

Unit - II

2. a) Determine the trignometric Fourier series for the square wave shown in fig. and plot the line spectrum. **(8)**



b) Describe the properties of continuous time fourier series. **(8)**

(OR)

2. a) Given the periodic waveform $x(t)=t^2, 0<t<1$. Determine the exponential fourier series and plot the magnitude and phase spectra. **(10)**

b) What is period signal? Give two examples of periodic signals. **(6)**

Unit - III

3. Explain the following properties of fourier transform along with proof :

i) Duality **(6)**

ii) Convolution property **(5)**

iii) Multiplication property **(5)**

(OR)

3. a) Find the inverse fourier transform of

$$x(jw)=\begin{cases}2\cos w & ,|w|\le\pi\\ 0 & ,|w|>\pi\end{cases}$$ **(8)**

b) Determine the CTFT of the signal s(t) = tcosAt **(8)**

Unit - IV

4. a) Write down the properties of laplace transform **(8)**

b) Find the laplace transform of

i) $s(t)=\cos^3(3t)$ **(4)**

ii) $s(t)=t\sin At$ **(4)**

(OR)

4. a) Discuss the properties of Z - transforms. **(8)**

b) Find the Z - transform and the ROC of the discrete sinsoid signal

$x(n)=[\sin(\Omega n)]u(n)$ **(8)**

Unit - V

5. Explain the following in detail.

a) Sampling of sinusoidal signals. **(8)**

b) Sampling theorem for low - pass signals. **(8)**

(OR)

5. a) What is the aliasing phenomenon? How can aliasing phenomenon be eliminated? **(8)**

b) Specify the Nyquist rate and Nyquist interval for each of the following :

i) $x(t)=\sin c(200t)+\sin c^2(200t)$ **(4)**

ii) $x(t)=\sin c^2(200t)$ **(4)**

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5E5022

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5E5022

B.Tech. V- Semester (Back) Examination, November - 2019
Electronics and Communication Engineering
5EC2A Linear Integrated Circuits
(Common For EC, EIC)

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

Min. Passing Marks : 26

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.*

UNIT - I

1. a) Derive the expression for differential mode gain and common- mode gain for dual input balanced output configuration of bipolar differential amplifier. **(8)**

b) A bipolar differential amplifier uses a transistor having $\beta_0 = 200$ and biased at $I_{CQ} = 100\ \mu A$. Determine R_C and R_E so that $|A_{dm}| = 500$ and CMRR = 80 dB. **(8)**

(OR)

1. a) Describe the offset voltage and current of the bipolar transistor differential amplifier. **(8)**

b) For type -741 op - amp following parameters are given. Quiescent collector current $I_C = 9.5\ \mu A$, $C_C = 30$ pF. Peak amplitude of input voltage $V_m = 15V$.

i) Determine the slew rate

ii) Determine fall power bandwidth f_{max} for the slew rate as obtained from part (i). **(8)**

UNIT - II

2. a) Draw the circuit for half and full wave rectifiers using op - amp. Also explain its working and analysis. **(8)**

b) In the circuit of non inverting summing op - Amp, $V_1 = +2V$, $V_2 = -4V$, $V_3 = +5V$. Input resistors for all the three input signals are same and are equal to $1k\Omega$. The feedback resistors R_f is $2k\Omega$. Determine the voltage V_p at the noninverting pin of the op - amp and the output V_0. Assume ideal op - Amp. **(8)**

(OR)

2. a) Draw the circuit diagram of phase shift oscillator. Explain its working with mathematical analysis. (8)

b) General the following equation using single op - Amp.

$$V_0 = -\int_0^t (v_1 + 2v_2 + 10v_3)dt$$

Find the component values if the integrating capacitor has a value 1 μ F. Assume ideal op - Amp. (8)

UNIT - III

3. a) Design a low pass active filters. (8)

b) A certain two - pole band pass filter response is required with a centre frequency of 2 KHz and a 3 dB bandwidth of 400 Hz. Determine Q, f_L and f_H. (8)

(OR)

3. a) Show that a notch response can be synthesized by a linear combination of the second - order low pass and high pass response. (8)

b) Design a second - order low - pass Butter worth filter for a cut off frequency of 2KHz. (8)

UNIT - IV

4. a) Describe the four quadrant multiplier and its application. (8)

b) Explain the basic blocks of linear IC voltage regulators. (8)

(OR)

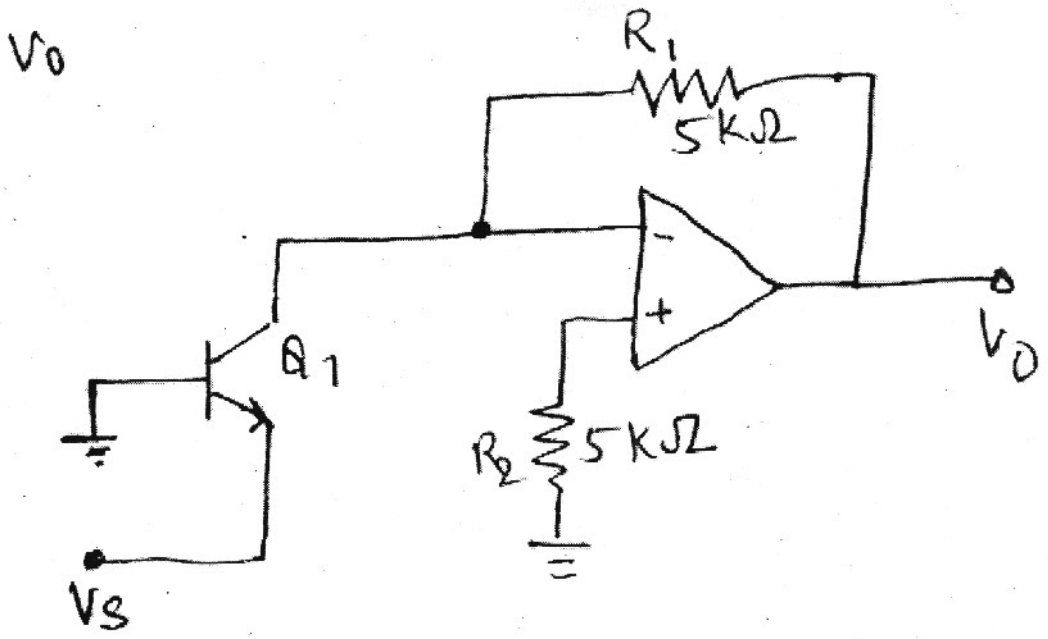
4. a) Explain the schmitt trigger working with suitable diagram and its applications. (8)

b) Design an astable multivibrator using 555 having an output frequency of 10 KHz with a duty cycle of 25 Y. (8)

UNIT - V

5. a) Describe the logarithmic and antilogy amplifier using diodes. Writes its applications. (8)

b) For the antilog amplifier shown in the following figure, calculate the output voltage V_0. **(8)**



(OR)

5. a) Write down the operating principle of PLL. Draw the linear model of PLL. **(8)**

b) Define the lock range and capture rage for PLL. **(4)**

c) Explain, the PLL and FM detector. **(4)**

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5E5023

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5E5023

B.Tech. V- Semester (Back) Examination, Nov. - 2019
Electronics and Communication Engg.
5EC3A Telecommunication Engg.

Time : 3 Hours **Maximum Marks : 80**
Min. Passing Marks : 26

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.*

UNIT - I

1. a) Derive an expression for the characteristic 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 constants. **(10)**

b) A transmission line has a series impedance of 0.0705+j0.2574 ohm/km and a shunt admittance of j 5.97×10^{-6} siemens/km. Find

i. Attenuation constant and phase, constant

ii. Characteristics impedance

iii. Velocity of propagation. **(6)**

(OR)

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) A transmission line is 15 km long and has the following distributed constant all mile loop at a frequency of 1000 Hz, R = 90 ohm, L = 0.001 H, C = 0.062 μF and G = 1.5 micro ohms. If the line is terminated in its characteristic impedance and supplied with an input power at the sending of 6mW. Calculate

i. The characteristics impedance.

ii. The magnitude of received current and power.

iii. The phase difference between the received and send current

iv. Wavelength and velocity of propagation. **(8)**

UNIT - II

2. a) Define stub matching and why it is needed. Explain different types of stub matching network arrangement. **(8)**

b) A parallel wire line has $Z_0 = 50\Omega$, $Z_R = (110\text{-}j80)$ ohm, S = 2.7. If the line has to transmit a power of 50 Watts. Find the magnitude of maximum and minimum voltage and current. Also find the magnitude of the receiving end voltage. **(8)**

(OR)

2. a) Discuss the measurement technique for the following parameters in a transmission line

i. VSWR

ii. Reflection coefficient

iii. Power **(12)**

b) A lossless transmission line is terminated with a 100 Ω load. If the SWR on the line is 1.5. Find the two possible values for the characteristics impedance of the line. **(4)**

UNIT - III

3. a) Derive the expressions to show that Z_0 and the series and shunt arm impedances of a symmetrical T - Network may be determined from the values of the input impedance of the network measured under open and short circuit condition. **(8)**

b) Design the following types of attenuators to have an attenuation of 40 dB and design impedance 300 Ω

i. Symmetrical lattice attenuator.

ii. Symmetrical bridge T attenuator. **(8)**

(OR)

3. a) Define the term image impedance, characteristic impedance, attenuation shift and phase shift. **(8)**

b) Distinguish between

i. Balanced and unbalanced network

ii. Image and iterative impedance. **(8)**

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Unit - IV

4. a) What are the functions and importance of transmission bridges? What are the various types of transmission bridges used in telephony? Describe each type with circuit diagram. **(8)**

   b) During the busy hour, 1200 calls were offered to a group of trunks and six calls were lost. The average call duration was 3 min. Find

   i. the traffic offered

   ii. the traffic carried

   iii. the traffic lost

   iv. the Grade of service **(8)**

OR

4. a) Explain briefly the following terms used in telephony

   i. Busy hour

   ii. Holding time

   iii. Traffic unit

   iv. Grade of service **(8)**

   b) In a teleprinter exchange serving 5000 subscribers, the total number of calls in a busy hour is 6000. If the holding time is 3 minutes. Find

   i. Calling rate

   ii. Rate of flow of traffic. **(8)**

Unit - V

5. a) Explain neatly the principle of operation of a facsimile transmitter and receiver system. **(8)**

   b) Write short notes on

   i. Erlangs

   ii. CCS **(8)**

OR

5. a) What do you understand by "Grade of Service"? How it is defined in terms of traffic parameter. **(8)**

   b) Draw and explain the trucking diagram of a 100. Line exchange with two motion selectors as line finders and final selectors. **(8)**

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5E5024

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5E5024

B.Tech. V- Semester (Back) Examination, November - 2019
Electronics And Communication Engg.
5EC4A Analog Communication

Time : 3 Hours **Maximum Marks : 80**
Min. Passing Marks : 24

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).*

UNIT - I

1. a) What is mean by noise figure and how can it be calculated for an amplifier or receiver? **(8)**

   b) A low noise amplifier operates with a band width of 500 MHz and a noise figure of 1.78 dB. Compute the equivalent Noise temperature and Noise power. **(8)**

(OR)

1. a) What do you mean by modulation? What is the need of modulation? Explain in detail. **(8)**

   b) What is noise? Briefly write about the different types of noise. **(8)**

UNIT - II

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

   b) A 10 KW carrier wave is amplitude modulated at 80% depth of modulation by a sinusoidal modulating signal. Calculate the sideband power, total power and the transmission efficiency of the AM wave. **(8)**

(OR)

2. a) Describe the mathematical analysis for coherent detection of baseband signal from SSB signal. **(8)**

   b) State the advantages, disadvantages and applications of AM. **(8)**

UNIT - III

3. a) Differentiate between FM and PM : How one can be generated from the other? **(8)**

   b) Explain Pre-emphasis and de-emphasis in FM broadcasting. **(8)**

(OR)

3. a) In a FM system, the modulating frequency $f_m = 1$ kHz, the modulating voltage $E_m = 2$ volt and the deviation is 6 kHz. If the modulating voltage is raised to 4 volt, then what is the new deviation? If the modulating voltage is further increased to 8 volt and modulating frequency is reduced to 500 Hz, what will be deviation? **(8)**

   b) Compare FM and AM systems. **(8)**

UNIT - IV

4. a) Derive an expression for SNR of FM demodulator. **(8)**

   b) Calculate figure of merit for single tone modulation in FM receiver. Take suitable assumptions if required. **(8)**

(OR)

4. a) With the help of block diagram, explain the noisy model of FM receiver. **(8)**

   b) Explain the term threshold effect and state its significance. **(8)**

UNIT - V

5. a) Explain Natural sampling and Flat top sampling. **(8)**

   b) Draw the circuit diagram of PAM modulation and explain this. **(8)**

(OR)

5. a) Discuss PPM demodulation using suitable diagram. **(8)**

   b) Compare PAM, PWM and PPM. **(8)**

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5E5025

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5E5025

B.Tech. V- Semester (Back) Examination, Nov. - 2019
Electronics and Comm. Engg.
5EC5A Microwave Engg. - I

Time : 3 Hours **Maximum Marks : 80**
Min. Passing Marks : 26

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 clear). Units of quantities used/calculated must be stated clearly.*

UNIT - I

1. a) Find the all electric and magnetic fields expression for TE mode inside a rectangular wave guide with the help of Maxwells equations. **(10)**

b) Why TEM mode cannot exist in hollow waveguide? Explain the reasons supporting with Maxwell's equations. **(6)**

(OR)

1. a) A rectangular waveguide with a = 5 cm, b = 2 cm cross section is used to propagate TM_{11} mode at 10 GHz. Determine the cut-off wavelength, guided wavelength and characteristics impedance. **(10)**

b) Define the following terms of waveguide propagation :

i) Cut-off frequency

ii) Dominant mode

iii) Degenerate mode **(6)**

UNIT - II

2. a) The scattering parameters of a two-port network are given by :

$$[s] = \begin{bmatrix} 0.2\angle 0^0 & 0.6\angle 90^o \\ 0.6\angle 90^o & 0.1\angle 0^o \end{bmatrix}$$

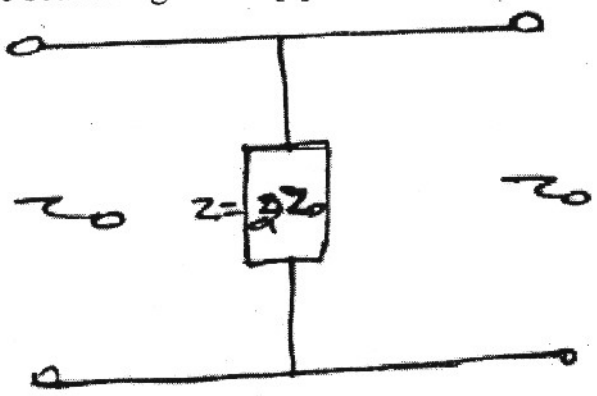
i) Determine whether the network is reciprocal and/or lossless.

ii) Find the return loss at port - 1 when port - 2 is short circuited. **(10)**

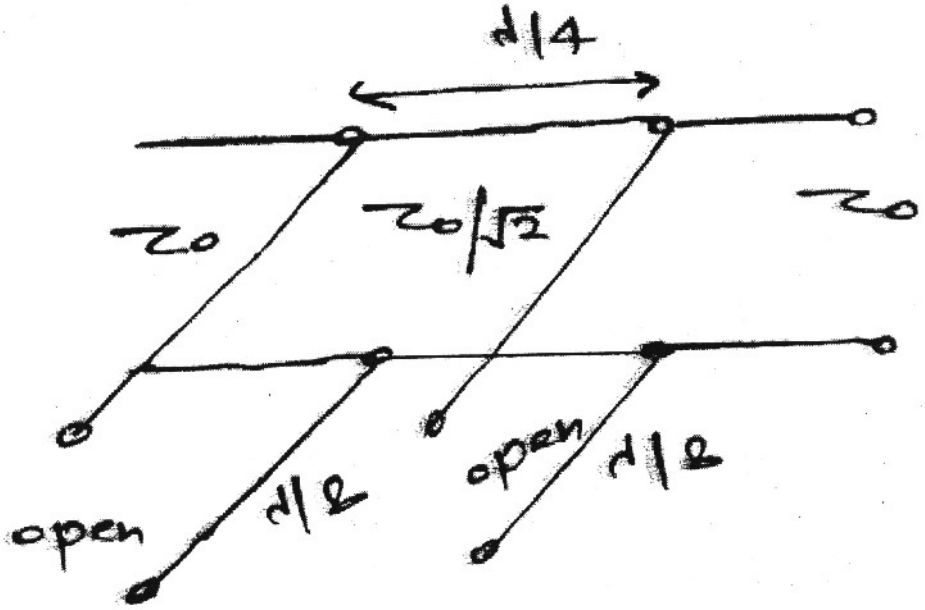
b) Why scattering parameters? Explain the properties of scattering parameters. **(6)**

(OR)

2. a) Find the scattering matrix[s] for the following network is **(8)**



b) Find the [ABCD] matrix of the following network. **(8)**



UNIT - III

3. a) A 20 mw signal is fed into one of the collinear arm (port - 1) of a lossless H - plan T-junction. Calculate the power decline through each port when other port are terminated by matched load. **(8)**

b) Define with s - matrix in short notes :

i) Magic Tees

ii) Directional Couple. **(8)**

(OR)

3. a) Explain the s-parameters of an G - plan tee when it's one port is matched.**(8)**

   b) A directional coupler of 10 dB couplier and 40dB directivity produces a transmission loss of 1 dB. For an input power of 10mW at the input port of the main arm, determine the power the other ports when matched terminated.**(8)**

UNIT - IV

4. a) Under what condition the double minimum method is useful for measurement of VSWR. **(8)**

   b) Explain the working principle of spectrum analyzer with the help of neat block diagram. **(8)**

(OR)

4. a) Calculate the VSWR of a Transmission system operating at 10GHz. Assume TE_{10} wave transmission inside a waveguide of dimensions a = 4 cm, b =2.5 cm. The distance measured between twice minimum power points is 1 cm on a slotted line. **(8)**

   b) Briefly explain the different method used for microwave power measurement. **(8)**

UNIT - V

5. Describe the fabrication process of mm why MMICs are superior to hybrid MICs? Explain how semiconductor and dielectric layers are grown while fabricating MMICs. **(16)**

(OR)

5. Write short notes (Any three)

   i) Photolithographic process

   ii) Thin film formation

   iii) MMIC technology

   iv) Discrete lumped components. **(16)**

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5E5026

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5E5026

B.Tech. V- Semester (Back) Examination, Nov. - 2019
Electronics and Comm. Engg.
5EC6.1A Biomedical Instrumentation

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

Min. Passing Marks : 26

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.*

UNIT - I

1. a) What are the selection criterias for transducer and electrodes? **(6)**

   b) Explain the principles and classification of transducers for bio medical applications. **(10)**

(OR)

1. Give the brief anatomy and physiology of following human body subsystems. Also discuss the engineering analogous and variable of prime importance for:

   a) Resipiratory system

   b) Muscular systems. **(16)**

UNIT - II

2. a) State the difference between ENG and EMG. **(2)**

   b) Write a brief note on ERG. **(6)**

   c) Why it is important that ECG leads are placed correctly? Also explain the working of ECG. **(8)**

(OR)

2. a) Describe the working of plethysmograph. **(8)**

   b) State the difference between direct and indirect blood pressure measurement. **(3)**

   c) How the electronic blood pressure instrument works ? Explain with suitable diagram. **(5)**

UNIT - III

3. a) What are the application of isotops for medical imaging? **(6)**

   b) What is CT scan? How it is different from MRI? **(4)**

   c) What is hematology ? Explain briefly. **(6)**

(OR)

3. a) What is ESR? How it is measured in clinical laboratory? Also state its importance for human body. **(10)**

   b) What are the applications of chromatography for clinical laboratory? **(6)**

UNIT - IV

4. a) How the biomedical telemetry works? Also explain the working of multichannel telemetry systems. **(8)**

   b) What is hemodialysis? When it is required? Describe its working with suitable diagram. **(8)**

(OR)

4. a) What are various types of laser used for medical applications. **(8)**

   b) When the cardiac pacemakers are required? **(2)**

   c) What are the different shock hazards in hsopital environment? **(6)**

UNIT - V

5. Write a short note on following (Any two).

   a) Atrail abnormalities.

   b) Data acquisition and processing.

   c) Real time computer application.

   d) Ventricular enlargement. **(16)**
