2 53

5E5021

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

5E5021

B.Tech. V Semester (Main&Back) Examination, Nov./Dec. - 2017
Electronic Instrumentation & Control Engg.
5EI1 A Signals & Systems
Common with EC

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. Differentiate following: **(4 × 4 = 16)**
   a) Continuous-time and discrete-time signals.
   b) Continuous-valued and discrete-valued signals.
   c) Multichannel and Multidimensional Signals.
   d) Deterministic and Random Signals.

OR

1. For the following input output relationships, determine whether the corresponding system is linear or not
   a) $y(t) = x^2(t)$ **(8)**
   b) $y(n) = 2x(n) - 3$ **(8)**

Unit - II

2. Write and Explain all the properties of Continuous-Time Fourier series. **(16)**

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. **(8)**
   b) Find the time-domain signal corresponding to the Discrete Periodic waveform $X_k = \cos(k4\pi/11) + 2j\sin(k6\pi/11)$. **(8)**

Unit - III

3. Find the Fourier transform of the following :
   a) $x(t) = \cos(\omega_0 t)$ **(5)**
   b) Unit step function u (t) **(5)**
   c) Continuous time signal $x(t) = e^{-at} u(t)$, $a > 0$ **(6)**

OR

3. Explain the following properties of Fourier transform along with proof
   a) Convolution property **(5)**
   b) Modulation property **(5)**
   c) Duality **(6)**

Unit - IV

4. Determine the Laplace transform of
   a) A unit Impulse function $x(t) = \delta(t)$ **(5)**
   b) A unit step function $x(t) = u(t)$ **(5)**
   c) A unit ramp function $x(t) = r(t)$ **(6)**

OR

4. a) Write and Explain the Initial value theorem and final value theorem with proof. **(8)**

   b) Determine the Z–Transform of the following:
      i) $x(n) = -u(-n-1)$ **(4)**
      ii) $x(n) = u(-n)$ **(4)**

Unit - V

5. Specify the Nyquist rate and Nyquist interval for each of the following signals
   a) $x(t) = \text{sinc}(200t)$ **(5)**
   b) $x(t) = \text{sinc}^2(200t)$ **(5)**
   c) $x(t) = \text{sinc}(200t) + \text{sinc}^2(200t)$ **(6)**

OR

5. Explain following in detail.
   a) Sampling of sinusoidal signals. **(8)**
   b) Sampling theorem for Low-pass signals. **(8)**

◆◆◆◆

255

5E5022

Roll No. _____ [Total No. of Pages : 4

5E5022

B.Tech. V Semester (Main/Back) Examination, Nov./Dec. - 2017
Electronics And Communication Engineering
5EC2A Linear Integrated Circuits
(Common with EI)

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) A differential amplifier has differential gain = 40 dB and CMRR = 60 dB. Find the output and percent error in following cases. **(8)**

i) Input v_1 = 40 μv and v_2 = –40μv

ii) Input v_1 = 800 μv and v_2 = 880μv

b) In a differential amplifier the performance is depends on emitter resistance R_1 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_1 electronically by active components. **(6)**

c) How slew rate can be controlled by external components in an Op-Amp? Explain? **(2)**

OR

1. a) Draw and explain the practical circuits used for measure following Op-Amp parameter **(4×2.5=10)**

i) Input offset voltage

ii) Slew rate

iii) Common mode rejection ratio (CMMR)

iv) Bias current I_B

b) For the differential amplifier shown in fig. - I. **(3×2=6)**

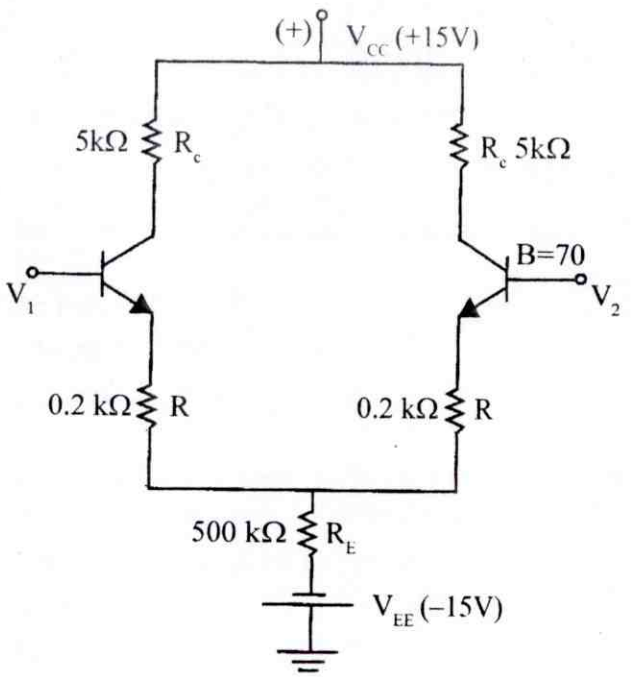


Fig. - 1

Determine i) Differential voltage gain
ii) Input resistance and
iii) Q-point

Unit - II

2. a) For the inverting amplifier shown in fig-2. **(8)**
i) Calculate voltage gain and input resistance
ii) Output voltage when input voltage = 10mV.

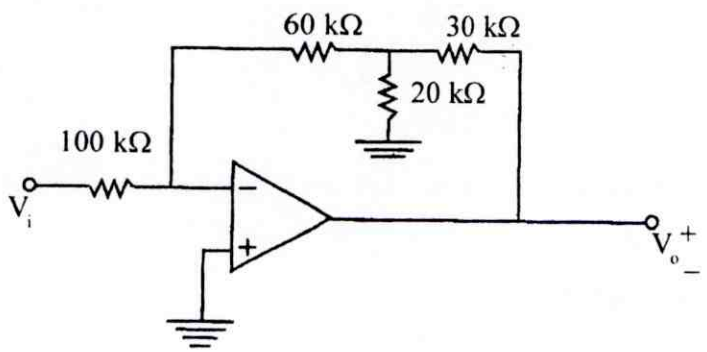


Fig. - 2

b) Draw the OP-Amp circuits to obtain. **(8)**
i) Precision full wave rectifier.
ii) Wein bridge oscillator with oscillation frequency 20 kHz.

OR

2. a) Design OP-Amp circuit to give output **(4+4=8)**

i) $V_0 = 3V_1 - 2V_2 + 5V_3 - 8V_4$.

ii) $V_0(s) = \frac{10}{(100s+1)} V_i(s)$.

b) Draw and explain following Op-Amp circuits **(2+2+4=8)**

i) Frequency to voltage converter.

ii) Voltage to frequency converter.

iii) Square wave generator for generate a clock of 10 kHZ.

Unit - III

3. a) Design a low pass first order Butterworth filter with cutoff frequency 40 kHZ and Mid band gain of 10. **(8)**

b) For the active filter shown in Fig. -3 calculate the cutoff frequency and midband gain. Also draw the frequency response. **(8)**

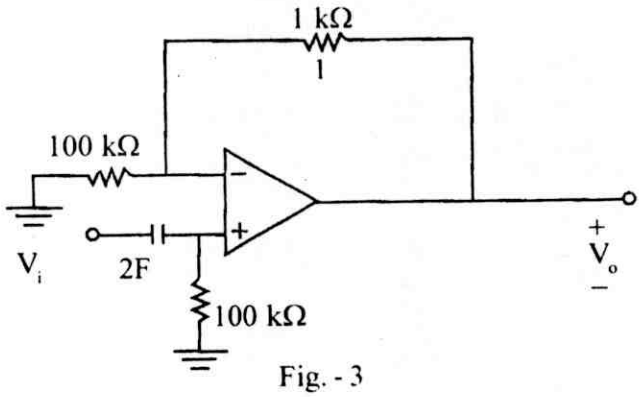


Fig. - 3

OR

3. a) What is switched capacitor filter? Realize a low pass filter with such filter and op-amp. **(6)**

b) Draw the phase shift of filter shown in fig. 4. Also calculate the phase shift in a input signal. $v_i = 10 \sin (1000t + 45°)$ **(6)**

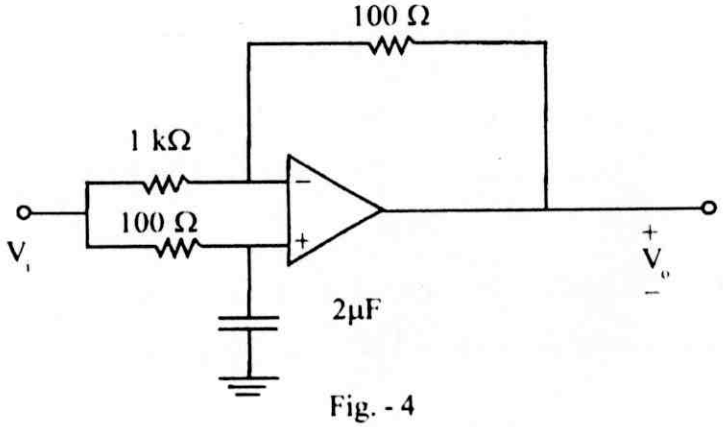


Fig. - 4

c) Draw the Notch filter and define its Quality factor. **(4)**

Unit - IV

4. a) Draw and explain the working of a series regulator and How it can be improved? **(8)**

b) Draw the waveform in circuit (fig. 5). **(8)**

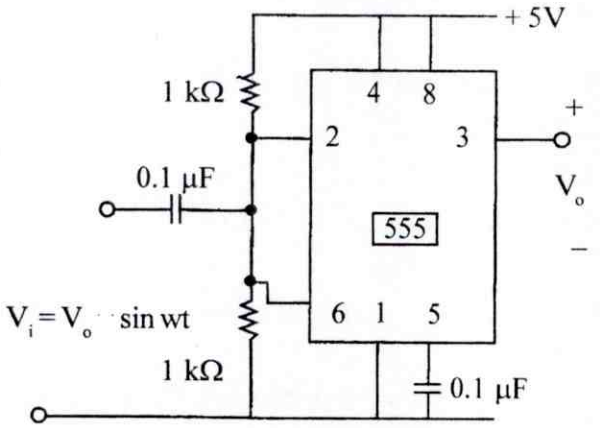


Fig. - 5

OR

4. a) Calculate the UTP and CTP of a Schmitt trigger shown in Fig-6. Also draw the output waveform when input is $v_i = v_o$ sin wt. **(8)**

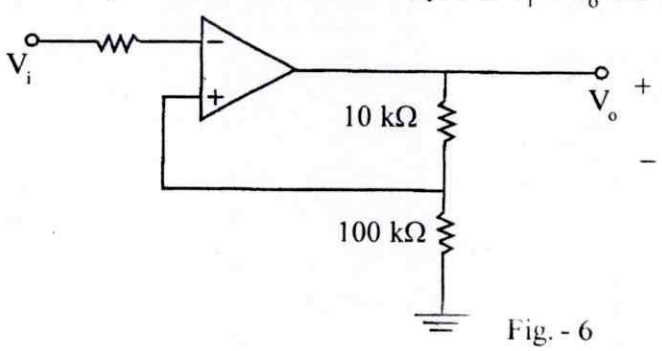


Fig. - 6

b) Draw the circuit diagram of Monostable Multivibrator using IC-555. Also draw its waveform. **(8)**

Unit - V

5. a) Draw Op-Amp circuit to solve the differential eq. $20y'' + 0.1y' + 2 = F(t)$. **(8)**

b) Draw circuit of FM detector using PLL and explain its working. **(8)**

OR

5. a) Define lock range and capture range of a PLL find their general expression. **(8)**

b) Draw and explain the working of Anti-log amplifiers. **(8)**

❄❄❄

2 59

5E5023

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

5E5023

B.Tech. V Semester (Main/Back) Examination, Nov./Dec. - 2017
Electronics And Communication Engineering
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) Discuss the different types of transmission lines and their applications. **(8)**

   b) A telephone line has R = 30 Ω / km, L = 100 mH/km, G = 0, and C = 20 μ F/km. At f = 1 kHz, obtain :

      i) The characteristic impedance of the line **(4)**

      ii) The propagation constant **(4)**

OR

1. a) What are the different types of losses in transmission lines? Explain them. **(8)**

   b) For a transmission line which is terminated in normalized impedance Zn, VSWR = 2. Find the normalized impedance magnitude. **(8)**

Unit - II

2. a) Describe the smith chart and its application in analysis of transmission lines. **(8)**

   b) A transmission line has a characteristic impedance of 50 + i0.01 Ω and is terminated in a load impedance of 73 - i 42.5 Ω. Calculate

      i) The reflection coefficient **(4)**

      ii) The standing wave ratio **(4)**

OR

2. a) Describe the single and double stub matching. **(8)**

   b) A lossless transmission line operating at 4.5 G Hz has L = 2.4 μ H/m and Zo = 85 Ω. Calculate the phase constant β and phase velocity μ. **(8)**

Unit - III

3. a) Describe the constant k-filters. **(10)**

   b) What do you mean by symmetrical and a symmetrical two port networks? Explain them. **(6)**

OR

3. a) Design a m-derived T-section low pass filter having cut-off frequency fc = 1000 Hz, design impedance R_k = 600 Ω and frequency of infinite attenuation f_∞=1050 Hz. **(8)**

   b) Describe the π-section and T-section attenuators. **(8)**

Unit - IV

4. a) What do you understand by cross talk? How it can be reduced? **(10)**

   b) Discuss the following : **(6)**

      i) Traffic unit

      ii) Grade of service

      iii) Busy hour

OR

4. a) Explain the frequency division and time division multiplexing. **(8)**

   b) Describe echo suppressors. **(8)**

Unit - V

5. Describe the following :

   a) EPABX **(8)**

   b) SPC digital telephone exchange **(8)**

OR

5. Describe the following :

   a) Fascimile services **(8)**

   b) STS & TST switches **(8)**

261

5E5024

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

5E5024

B.Tech. V Semester (Main/Back) Examination, Nov./Dec. - 2017
Electronics & Communication Engineering
5EC4A Analog Communication

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) Noise and other types of signal power needs to be expressed in two commonly used units of dBW and dBm which are absolute units of power compared to 1W and 1m W respectively. **(10)**

i) Change the powers into dBW and dBm : 470mW; 1W& 100nW

ii) Change the powers into watts : –20dBW; 47dBm; 0dBm

b) Prove that the effective noise temperature of k - 2 port networks in cascade is

$$Te = Te_1 + \frac{Te_2}{G_1} + \frac{Te_3}{G_1 G_2} + \ldots + \frac{Te_k}{G_1 G_2 \ldots\ldots G_k} \qquad (6)$$

OR

1. a) i) An electrical communication system uses a channel that has a 20dB loss. Estimate the received power if the transmitted power is 1W.

ii) The channel interfaces in a point-to-point communication system attenuates the signal by 3dB each. The channel loss is 30dB. If the received signal is to be amplified such that the over all loss is limited to 20dB. Find the amplifier gain. **(8)**

b) Explain using mathematical equation noise temperature and noise figure in communication systems. **(8)**

Unit - II

2. a) Explain with suitable sketch and plot the generation of SSB. Signals using phase - shift method. **(8)**

b) A DSB modulated signal $\phi(t) = A\ mt \cos 2\pi fet$ is multiple with a local carrier $c(t) = \cos(w_c t + \theta)$ and the output is passed through a LPF with a bandwidth equal to the bandwidth of the message m(t). If the power of the message signal m(t) is P_m determine. **(8)**

i) The power of the modulated signal.

ii) The power of the signal at the output of the LPF.

OR

2. a) With the help of neat sketch explain how VSB signals are generated. **(6)**

b) When a sinusoidal test tone of frequency Wm(in radian) is applied to the input of the modulation in Ang broad casting (DSB with full carrier) . the modulated waveform is as shown in figure 1. Where the carrier frequency is W_c. **(10)**

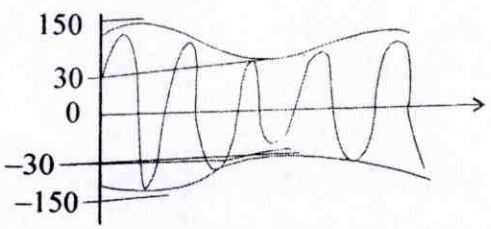


Figure-1.

i) Find the modulation index and the expression of the modulated signal.

ii) Determine the total Average power of the modulated signal the carrier power the USB power and the LSB power (assume unit load)

iii) Determine the modulation efficiency.

iv) What is the peak envelop power accross the 60Ω load.

Unit - III

3. a) An angle modulated signal is described by $X_c(t) = 10 \cos [2\pi(10^6)t + 0.1 \sin (10^3)\pi t]$ **(8)**

i) Considering $X_c(t)$ as a PM signal with $k_p = 10$ find m(t)

ii) Considering $X_c(t)$ as an FM signal with $k_f = 10\pi$. Find m(t).

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

OR

3. a) What are the effects of channel non-linearity. **(4)**

   b) Compare AM, FM and PM and tabulate their performance. **(6)**

   c) Explain with neat sketch. FM broad casting transmitter and Receiver. **(6)**

Unit - IV

4. a) With the help of mathematical expression, explain the SNR calculation for synchronous detection of DSB. **(8)**

   b) What is pre-emphasis & de-emphasis? How it is help full in communication system. **(8)**

OR

4. a) What is threshold effect? **(4)**

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

   c) What are internal noises in a communication systems? Explain in brief. **(6)**

Unit - V

5. a) Compare and tabulate. Natural and flat top sampling. **(8)**

   b) With the help of neat sketch explain how PPM. modulation and demodulations. is done. **(8)**

OR

5. a) Explain what do you understand by noise performance of pulse Analog Modulation system. How it is calculated mathematically? **(8)**

   b) How PWM signal are reconstructed at the receiver side? **(8)**

❁❁❁

264

5E5025

Roll No. _____ |Total No. of Pages : 4

5E5025

B.Tech. V Semester(Main/Back) Examination, Nov./Dec. - 2017
Electronics & Communication Engineering
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 suitable be assumed and stated clearly). Units of quantities used/calculated must be stated clearly.*

Unit - I

1. a) Discuss the following in a rectangular waveguide,
i) Degenerate mode
ii) Dominant mode

(4 +4 = 8)

b) An air-filled rectangular waveguide of inside dimensions 7 × 3.5 cm operates in the dominant TE_{10} mode.
i) Find the cutoff frequency.
ii) Determine the phase velocity of the wave in the guide at a frequency of 3.5 GHz.
iii) Determine the guided wavelength at the same frequency.

(2 + 3 + 3 = 8)

OR

1. a) A shielded stripline has the following parameters
Dielectric constant of the insulator, $\epsilon_r = 2.56$
Strip width, $w = 25$ mils
Strip thickness, $t = 14$ mils
Shield depth, $d = 70$ mils
i) The K factor.
ii) The fringe capacitance.
iii) The characteristic impedance of the line.

(2 + 2 + 2 = 6)

b) A loss less parallel stripline has a conducting strip width w. The substrate dielectric separating the two conducting strips has a relative dielectric constant ϵ_{rd} of 6.0 (B_eO) and a thickness d of 4.0 mm.

Calculate:

i) The required width, w of the conducting strip in order to have a characteristic impedance of 50Ω.

ii) The strip-line capacitance.

iii) The strip-line inductance.

iv) The phase velocity of the wave in the parallel stripline.

(2½ × 4 = 10)

Unit - II

2. a) Derive the expression for average power flowing into the port-n of a n-port network, in terms of parameters proportional to incident wave and outgoing wave. **(8)**

b) Derive the following in terms of S-parameters when the ports are matched terminated in two port network.

i) Insertion loss.

ii) Transmission loss.

iii) Reflection loss.

iv) Return loss. **(2 × 4 = 8)**

OR

2. Discuss the following properties of S-parameters.

i) Zero property of [S] matrix.

ii) Unity property of [S] matrix.

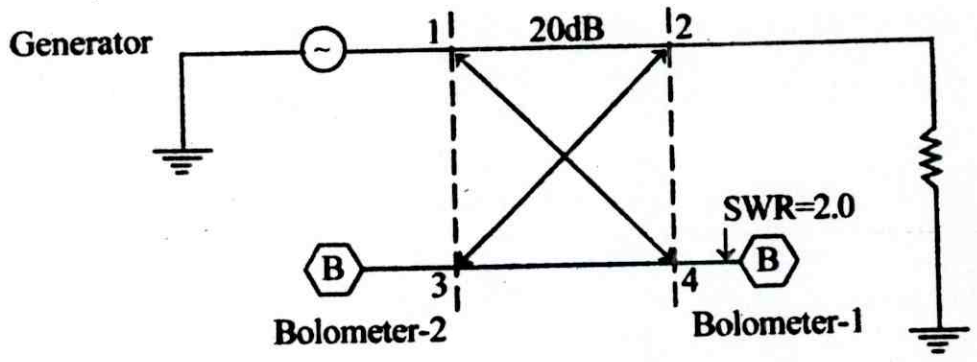
iii) Symmetric property of [S] matrix.

iv) Phase shift property of [S] matrix.

(4 × 4 = 16)

Unit - III

3. Discuss the [S] matrix of a directional coupler. A symmetric direction coupler with infinite directivity and a forward attenuation of 20 dB is used to monitor the power delivered to a load Z_l, as per fig (1) Bolometer-1 introduces a VSWR of 2.0 on arm 4; bolometer-2 is matched to arm 3. If bolometer-1 reads 8mW and bolometer-2 reads 2mW, find (a) the amount of power dissipated in the load Z_l; (b) the VSWR on arm 2.



(4 +6 + 6 = 16)

OR

3. With the help of a diagram, explain the following microwave components,

   i) Wilkinson Power Divider

   ii) Ring Resonator

   iii) Backward wave coupler

(5 + 5 + 6 = 16)

Unit - IV

4. a) With the help of diagram, discuss an arrangement to measure low microwave power within 1 to 10 mW range. **(8)**

   b) Draw and explain the block diagram of set-up for the measurement of VSWR at the input of the component under test. **(8)**

OR

4. a) What are the types of network analysers. Explain any one of them with the help of suitable block diagram. **(8)**

   b) Discuss how measurements are made using a noise-figure meter. **(8)**

Unit - V

5. a) In MMIC, a planar resistor has the following parameters,

Resistive film thickness, t = 0.1 μm.

Resistive film length, l = 10 mm

Resistive film width, w = 10 mm

Sheet resistivity of gold film, $\rho = 2.44 \times 10^{-8}$ Ω–m.

Calculate the planar resistance and also draw the diagram of a thin film resister. **(5 + 3 = 8)**

b) An interdigitated capacitor fabricated on a GaAs substrate has the following parameters,

Number of fingers, N = 8

Relative dielectric constant of GaAs, $\epsilon_r = 13.10$

Substrate height, h = 0.254 cm

Finger length, l = 0.00254 cm

Finger base-width, w = 0.051 cm

Compute the capacitance. **(8)**

OR

5. a) Describe the MMIC techniques and also list the basic materials for MMIC. **(8)**

b) Explain the photolithography process with the help of suitable diagram. **(8)**

◆◆◆◆

2 6 8

5E5026

Roll No. _____ Total No. of Pages : 2

5E5026

B.Tech. V Semester (Main/Back) Examination, Nov. /Dec. - 2017
Electronics & Communication 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 suitable be assumed and stated clearly). Units of quantities used/calculated must be stated clearly.*

Unit - I

1. Write and Explain the description of neural, muscular, cardiovascular and respiratory systems of human body subsystems along with their electrical and mechanical activities in detail. **(16)**

OR

1. a) Explain the Principles and classification of transducers for Bio-medical applications. **(10)**

b) What is the Selection criteria for transducers and electrodes. **(6)**

Unit - II

2. a) What do you mean by Electrical activity of excitable cells. Explain. **(8)**

b) Write a technical note on ECG in detail. **(8)**

OR

2. Explain following terms incorporated with Cardiovascular system Measurement

a) Blood pressure **(4)**

b) Blood flow **(4)**

c) Cardiac output **(4)**

d) Cardiac rate **(4)**

Unit - III

3. a) Explain the working principle for measurement of partial pressure of Oxygen (P02) in the blood and describe suitabel scheme for it. **(10)**

   b) Explain the working principal of Spectrophotometers. **(6)**

OR

3. Write short notes on:

   a) Diagnostic X-Rays **(5)**

   b) MRI **(5)**

   c) Ultrasonography **(6)**

Unit - IV

4. a) What are the various elements of an Intensive Care Unit (I.C.U)? Explain each element in brief. **(8)**

   b) Explain various methods of electrical accident prevention in medical instrumentation systems. **(8)**

OR

4. What is the requirement of Therapeutic and Prosthetic Devices. Explain the working of cardiac pacemakers, defibrillators in detail. **(16)**

Unit - V

5. a) What do you understand by Atrial abnormalities. Explain in detail. **(10)**

   b) Write and explain the advantages of remote data recording and management. **(6)**

OR

5. a) Write a short note on Ventricular enlargement. **(4)**

   b) Write and explain Clinical applications of EEG, EMG and ERG. **(12)**

◆◆◆◆

270

5E3115

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

5E3115

B.Tech. V Semester (Back) Examination, Nov./Dec. - 2017
Electronic Instrumentation & Control Engg.
5EI3(O) Modern Control System

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 state variable? Give the advantages of modern control theory over conventional control theory. **(8)**

   b) Derive the state variable control model for the system shown on figure.(1) **(8)**

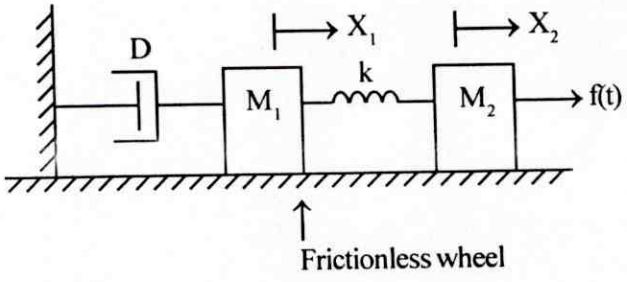


Fig.1

OR

1. a) Explain the following terms : **(8)**

   i) State vector

   ii) State space

   iii) State space equation

b) Write state equation for the networks shown below : **(8)**

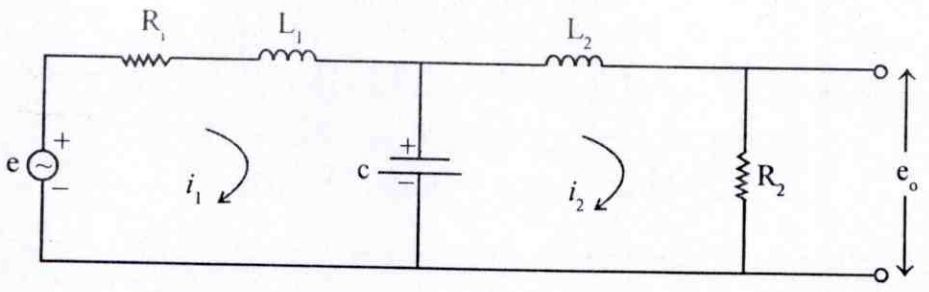


Fig.

Unit - II

2. a) Derive the transfer function from state-model. **(8)**

b) Derive state space representation using canonical variable's equation. **(8)**

OR

2. a) A system is described by the following equations : **(8)**

$$x(t)=\begin{bmatrix}-1 & 1\\ 0 & -2\end{bmatrix}x(t)+\begin{bmatrix}1 & 0 & 1\\ 0 & 1 & 1\end{bmatrix}u(t)$$

$$y(t)=\begin{bmatrix}1 & 2\\ 1 & 0\\ 1 & 1\end{bmatrix}x(t)$$

Find the transfer function of the system.

b) The transfer function G(s) of a system is given by $G(s)=\dfrac{(s+3)}{(s+2)(s+5)}$ transform the system in Jordan canonical form. **(8)**

Unit - III

3. a) Explain the concept of controllability and observability and compute these in corporate with state transition matrix. **(8)**

b) Obtain the state transition matrix $\phi(t)$ for the matrix (8)

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

OR

3. a) Define diagonalization. Explain its importance in modern control system. (8)

b) Explain pole placement by state feedback. (8)

Unit - IV

4. What are the properties of Z-transform? Find the relationship between Z and S domain. (16)

OR

4. a) Write short note on sampled data control systems. (8)

b) Find the Z-transform of the following :

i) $\dfrac{a}{(s+a)^2}$

ii) $e^{-at}\sin wt$

By using the properties of Z - Transform (8)

Unit - V

5. Explain digital PID controller s position servo. (16)

OR

5. Write a short notes on : (16)

a) Design on 2-plane

b) Design of w-plane

5E5033

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

5E5033

B.Tech. V Semester (Main/Back) Examination, Nov./Dec. - 2017
Electronics And Communication Engineering
5EI3A Control System - II

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 Relation between Transfer function and state equation? **(8)**

b) Find the state space Representation for the discrete time system : **(8)**

$10\ \mu(k) = y(k+3) + 6y(k+2) + 11y(k+1) + 8y(k)$

OR

1. a) Explain the concept of states and state model? **(8)**

b) Obtain the state space representation of the system described by : **(8)**

$y(k+3) + 2y(k+2) + 3y(k+1) + 2y(k) = 5\mu(k+2) + 3\mu(k+1) + \mu(k)$

Unit - II

2. Convert the following transfer function into state model with controllable form.

$$\frac{y(S)}{\mu(S)} = \frac{1}{S^3 + 4S^2 + 2S + 1}$$ **(16)**

OR

2. Consider a single input single output system with state variable description

$$A = \begin{bmatrix} 0 & 1 \\ -12 & -8 \end{bmatrix} \quad B = \begin{bmatrix} 0 \\ 1 \end{bmatrix} \quad C = \begin{bmatrix} 8 & 1 \end{bmatrix}$$

a) Diagonalize the system

b) Deduce the transfer function **(16)**

Unit - III

3. Explain the following terms : **(16)**

a) Controllability

b) Observability

c) Stabilizability

d) Detectability

OR

3. a) Consider the state equation

$$\begin{bmatrix} \dot{x}_1 & (t) \\ \dot{x}_2 & (t) \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix} \begin{bmatrix} x_1 & (t) \\ x_2 & (t) \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} r(t)$$

obtain the state transition matrix. **(8)**

b) What is Ackermann's formula? How it is used. **(8)**

Unit - IV

4. Consider a plant defined by the following state variable model : **(16)**

$x(k+1) = \quad F \quad x(k) \; + \quad G \quad u(k)$

$y(k) = \quad C \quad x(k) \; + \quad D \quad u(k)$

Where :

$$F = \begin{bmatrix} 0.5 & 1 & 0 \\ -1 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix} \qquad G = \begin{bmatrix} 1 \\ 1 \\ 2 \end{bmatrix}$$

$$C = \begin{bmatrix} 1 & 0 & 0 \end{bmatrix} \qquad D = [0]$$

Design an observer which places the observer poles at $-0.5 \pm$ y 1 and at -1.

OR

4. Design a combined compensator of a Regulator containing a controller and an estimator for process given by : **(16)**

$$G(z) = \frac{4}{(z + 0.5)^2}$$

The design specification of the controller and observer is that both are critically damped with $W_n = 0.5$ rad/sec and $T = 1$ sec.

Unit - V

5. Find the Z transform : **(4 × 4 = 16)**

a) $G(s) = \dfrac{10}{s(s+1)\,(s+3)}$

b) $G(s) = \dfrac{1}{s^2 + 2s + 2}$

c) $f(t) = t^2$

d) $f(t) = \mu(t) + t$; $u(t)$ is unit step function

OR

5. a) Design an example to illustrate a complete control system utilizing introduction to discrete time systems? **(8)**

b) Explain the various properties of Z-Transform. **(8)**

5E5034

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

5E5034

B.Tech. V Semester (Main/Back) Examination, Nov./Dec. - 2017
Electronic Instrumentation and Control Engineering
5EI4A Electronic Measurement and 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) Explain the working of sweep frequency generators with labelled diagram. **(10)**
   b) What do you mean by sine wave generators. **(6)**

OR

1. a) Explain the working of frequency selective wave analyzer. Give diagram in support of your answer. **(10)**
   b) What is the main function of spectrum analyzer. **(6)**

Unit - II

2. Differentiate between A/D and D/A converters. Explain their working with diagram and give individual application. **(16)**

OR

2. a) What are data acquisition systems? **(8)**
   b) Discuss sampling theory and its application in current. **(8)**

Unit - III

3. a) Explain the working of hall effect transducers. **(10)**
   b) Why we use digital voltmeter to measure the voltage instead of analog voltmeters. **(6)**

OR

3. a) Explain the working of electronic multimeters. **(8)**
   b) Give the application area of Digital storage oscilloscope. **(8)**

Unit - IV

4. a) Discuss vernier technique for time measurement. **(8)**

   b) What do you mean by order of events and time standards? **(8)**

OR

4. Explain the following terms with reference to frequency measurement. **(16)**

   a) Gating error

   b) Trigger level error

   c) Time base error

Unit - V

5. Define the term telemetry. Explain PWM and digital telemetry schemes in detail with suitable diagrams. **(16)**

OR

5. a) Discuss the procedure for calibration of plant instruments and master instruments. **(10)**

   b) Explain the types and procedure of maintenance. **(6)**

2708

5E5035

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

5E5035

B.Tech. V Semester (Main/Back) Examination, Nov./Dec. - 2017
Electronic Instrumentation & Control Engg.
5EI5A Microprocessors

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 suitable be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

Unit - I

1. a) i) Explain the programming model of 8085. **(4)**

ii) Explain the following instruction of 8085. **(4)**

1) RIM 2) SIM 3) EI 4) DI

b) Write a program to multiply two 8 bit numbers. **(8)**

OR

1. Design 8085 based system with following specifications **(16)**

i) System frequency 3 MHz.

ii) Interface 16kb EPROM using 8 kb chip.

iii) Interface 32 kb RAM using 16 kb chip.

iv) One 8255 in memory mapped I/O.

Unit - II

2. a) Explain the evolution of microprocessors and list the sequence of events that occurs when the 8085 microprocessor reads from memory. **(8)**

b) Write a 8085 program that enables the RST 7.5 and RST 5.5 inputs. **(8)**

OR

2. a) Explain the functions of various control and status signals available on 8085 microprocessor. **(8)**

b) What is stack and subroutine? State the necessity of these in 8085 microprocessor based system. Give instructions related to stock and subroutine. **(8)**

Unit - III

3. a) Compare Hardware Interrupt and software interrupt. Explain Interrupt structure of 8085 microprocessor. **(8)**

   b) Write short note on: **(8)**

   i) 8254, programmable interrupt timer

   ii) 8259, programmable interrupt controller

OR

3. a) Explain the difference between **(10)**

   i) Action of HLT and HOLD

   ii) A software interrupt and hardware interrupt

   iii) Action of 'RESET' and 'JMP 0000'

   iv) Instruction cycle, and machine cycle

   v) Arithmetic shift and logical shift

   b) Show which interrupt will be masked it the following instructions are executed MVI A, 10 H SIM. **(6)**

Unit - IV

4. a) Draw the block diagram of 8257 DMA and explain its operation. **(8)**

   b) Interface one 7 segment display and 8 keys to 8085 microprocessor through 8255. Write a program of flowchart to display key number which is pressed. **(8)**

OR

4. a) Draw block diagram of 8259 and explain its operation. **(8)**

   b) Any number of (2 K × 8) ROM is available. Design and interface to 8085 microprocessor to generate (8 K × 8) memory. Assume the starting address to be 8000H. **(8)**

Unit - V

5. a) Discuss the addressing modes available on 8086 for accessing data and instruction Hence find the physical address of the top of the stack when stack segment register and stack pointer register contain 3000H and 8434H. **(8)**

   b) What are various register used in 8086 microprocessor. **(8)**

OR

5. a) Draw the pin diagram of 8086 microprocessor and explain its various parts. **(8)**

   b) Explain the following instructions in 8086 with suitable example. **(8)**

   i) PUSH

   ii) USHF

   iii) SAHF

   iv) CMPS

◆◆◆◆

2 i c

5E5036

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

5E5036

B.Tech. V Semester (Main & Back) Examination, Nov./Dec. - 2017

Electronic Instrumentation & Control Engineering

5EI6.1A Optimization Techniques

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 is optimization technique? Write Engineering application of optimization technique. **(8)**

   b) Explain following with suitable example.

   i) Objective function **(2)**

   ii) Simplex Method **(6)**

OR

1. a) Solve the following LPP by graphical method. **(8)**

   Maximize $Z = 5x_1 + 6x_2$

   subject to

   $x_1 + x_2 <= 10$

   $x_1 - x_2 >= 3$

   $5x_1 + 4x_2 <= 35$

   $x_1 >= 0$ and $x_2 >= 0$

   b) Solve the following LPP by Dual simplex method. **(8)**

   Maximize $Z = -4x_1 - 8x_2 - 9x_3$

   subject to

   $2x_1 - x_2 - x_3 \leq 1$

   $3x_1 - 4x_2 + x_3 \leq 3$

   $-5x_1 - 2x_2 \leq -8$

   $x_1, x_2, x_3 \geq 0$

Unit - II

2. What is The Revised Simplex Method? Solve following using Revised Simplex Method. **(16)**

Max $Z = 2x_1 + x_2$

subject to

$3x_1 + 4x_2 \leq 6$

$6x_1 + x_2 \leq 3$

and $x_1, x_2 \geq 0$

OR

2. a) What is digeneracy in transportation problem? Explain how to solve the digeneracy in transportation problem. **(8)**

b) Solve the following assignment problem for minimization. **(8)**

	1	2	3	4	5
A	8	8	8	11	12
B	4	5	6	3	4
C	12	11	10	9	8
D	13	21	18	17	15
E	10	11	10	8	12

Unit - III

3. a) What is the objective of the Critical Path Method (CPM)? Explain using suitable example. **(8)**

b) Describe the role and application of PERT/CPM for project scheduling. **(8)**

OR

3. a) Explain Network analysis model for Shortest-Path Problem. **(10)**

b) What is the least expensive way to speed up a project to meet a targeted completion time? **(6)**

Unit - IV

4. a) What is Unconstrained optimization? Explain types of one-Dimensional Unconstrained Optimization Techniquesone. **(8)**

b) What is Constrained optimization? Classify methods of Constrained optimization. **(8)**

OR

4. a) What do you mean by direct search method employed in solving the Non-linear optimization problems. Give a brief of the method. **(8)**

   b) Find the minimum of the function $f = x^5 - 5x^3 - 20x + 10$ using Fibonacci method, in the interval (0, 5). **(8)**

Unit - V

5. a) What do you mean by multi-stage decision in dynamic methods of optimization problems. Give a brief of any one method. **(8)**

   b) Solve the following LP problem by dynamic programming : **(8)**

   Max $Z = 6x_1 + 5x_2$

   subject to

   $x_1 \leq 2, x_2 \leq 6$

   $6x_1 + 2x_2 \leq 18$

   and $x_1, x_2 \geq 0$

OR

5. a) What do you mean by dynamic programming in optimization problems. Give a brief of the method. **(8)**

   b) What is the principle of optimality? How to convert an initial value problem and final value problem? **(8)**

❄❄❄