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5E5021

Roll No. : _____ Total Printed Pages : 4

5E5021

B. Tech. (Sem. V) (Mercy Back) Examination, November - 2018
Electronic Instrumentation & Control Engg.
5EI1A Signals & Systems (EC, EI)

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

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.*

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT - I

1 (a) Discuss the following properties of continuous-time and discrete-time LTI system with examples :
(i) Commutative property
(ii) Distributive property. **8**

(b) Find the Convolution sum of two discrete-time signals.

$s(n) = e^{-n^2}$, *for all* n

and $h(n) = \begin{cases} e^{n}, & n < 0 \\ e^{-n}, & n \geq 0 \end{cases}$ **8**

OR

274

1 (a) Distinguish the following systems :

(i) Static and dynamic systems

(ii) Time-invariant and time varying systems

(iii) Causal and non causal systems

(iv) Stable and unstable systems.

4×3=12

(b) Find out the fundamental period of the signal

$S(t) = 2\cos(10t + 1) - \sin(4t - 1)$

4

UNIT - II

2 (a) Find the trignometric and exponential Fourier series for the continuous-time wave form shown in Fig. (a).

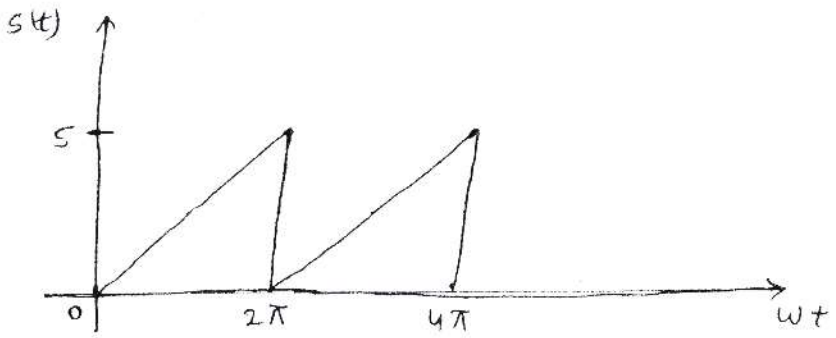

Fig. (a)

12

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

4

OR

2 (a) Discuss various properties of Discrete-time Fourier series (DTFS) in brief.

8

(b) Determine the Fourier series representation for the output to a discrete time LTI system with unit-sample (impulse) response.

$h(n) = \left(\frac{1}{2}\right)^n u(n)$ and input $s(n) = \cos \omega_0 n$.

8

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UNIT - III

3 (a) Determine the CTFT of the signal $s(t) = t \cos At$. **6**

(b) Determine the CTFT of the sinusoidal pulse shown in fig.

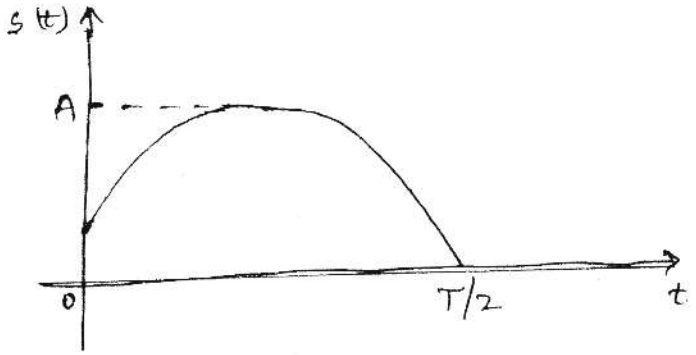

Fig. **10**

OR

3 (a) Discuss following properties of DTFT :
(i) The convolution property of DTFT
(ii) The multiplication property of DTFT **8**

(b) Determine DTFT of a discrete - time signal
$S(t) = A^n u(n), \quad |A| < 1$ **8**

UNIT - IV

4 Find the Laplace transform of the following continuous time functions.
(i) $S(t) = t^3 + 3t^2 - 6t + 4$
(ii) $S(t) = \cos^3 3t$
(iii) $S(t) = \sin At \cos Bt$
(iv) $S(t) = t \sin At$. **4×4=16**

OR

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

(b) Determine the Z-transform of the following discrete-time signals.

(i) $S(n) = A^n u(n)$

(ii) $S(n) = \cos(w_0 n)\, u(n)$.

2×4=8

UNIT - V

5 (a) Define following terms :

(i) Higher frequency component of the message signal

(ii) Nyquist rate

(iii) Sampling rate or frequency

(iv) Under sampling

(v) Critical sampling

(vi) Over sampling.

2×6=12

(b) Describe linear interpolation between sample points. 4

OR

5 (a) Find the Nyquist rate and Nyquist interval for the continuous time signal

$$s(t) = \frac{1}{2\pi} \cos(4000\pi t) \cos(1000\pi t)$$

8

(b) What is aliasing phenomenon ? How can aliasing phenomena be eliminated ? 8

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5E5022

Roll No. : _____ Total Printed Pages : 7

5E5022

B. Tech. (Sem. V) (Main / Back) Examination, November - 2018
Electronics & Communication Engg.
5EC2A Linear Integrated Circuits

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

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.*

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT - I

1 (a) Draw the output waveform in fig. 1 (a).

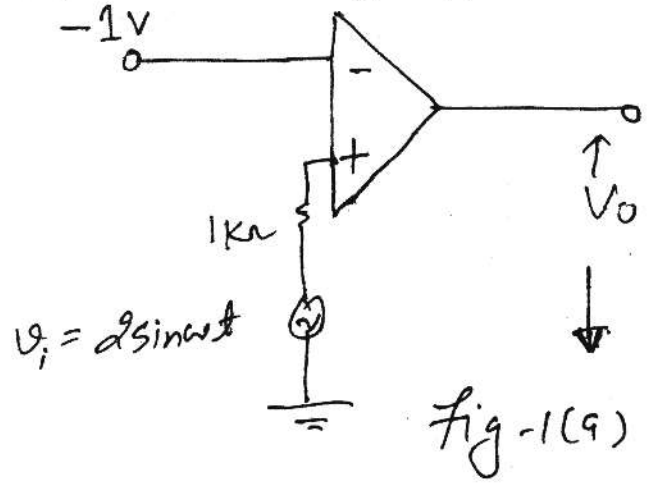


Fig-1(a)

8

(b) Calculate the output voltage in ckt fig. 1(b).

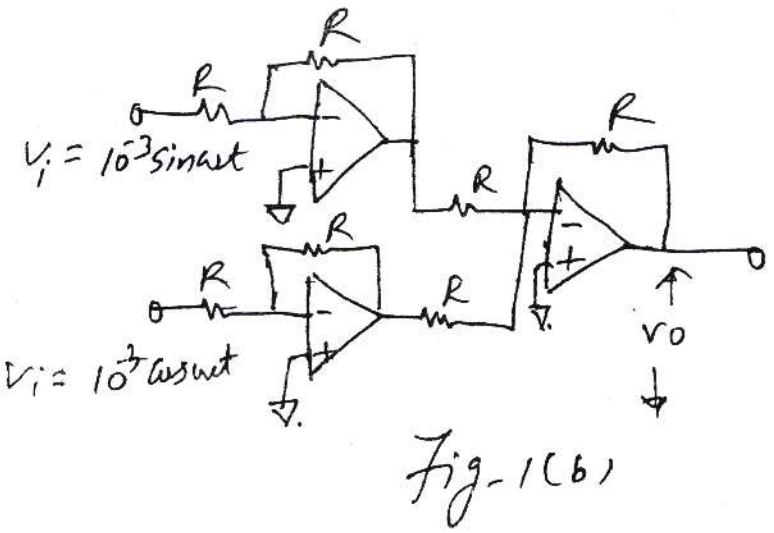


Fig-1(b)

8

OR

1 (a) Find the O/P of an OP-AMP under following conditions :

(i) Both I/P connected to ground directly as (fig-1C).

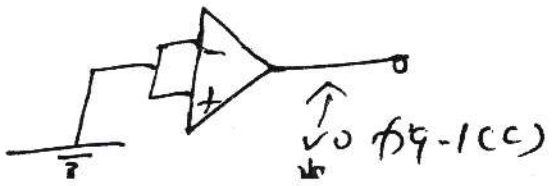


fig-1(c)

(ii) Both I/P connected to ground through resistances at fig 1(d).

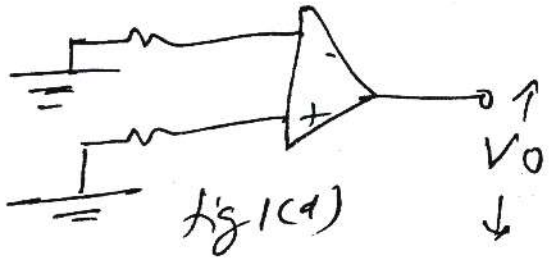


fig 1(d)

(iii) Both I/P tied to each other through resistance as given I/P as figure 1(e).

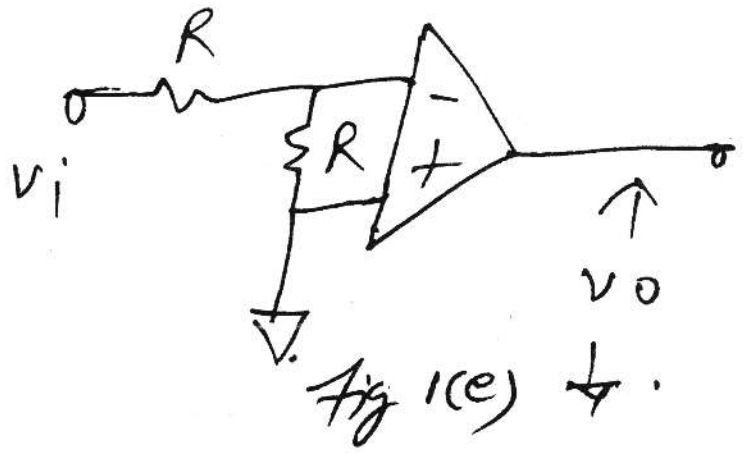


Fig 1(e)

8

(b) What is the role of a constant current source in OP-AMP ? How we can achieve a constant current source using BJT ?

8

UNIT - II

2 (a) Draw the frequency response of OP-AMP ckts in fig 2(a) and 2(b).

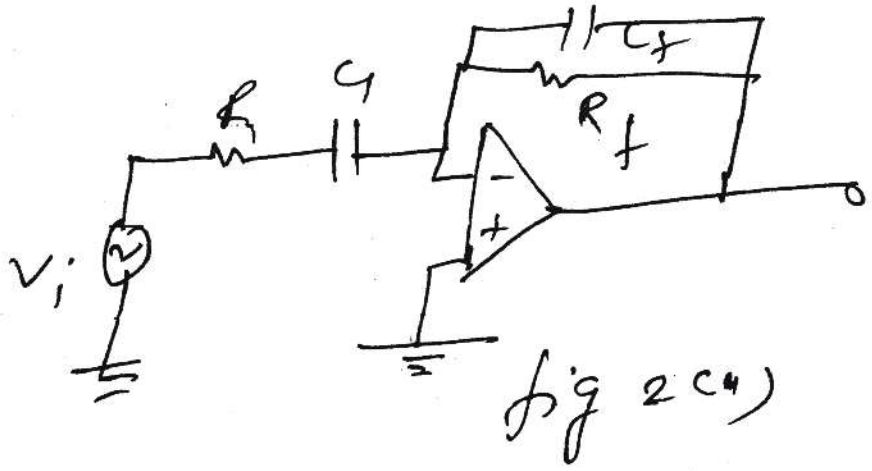
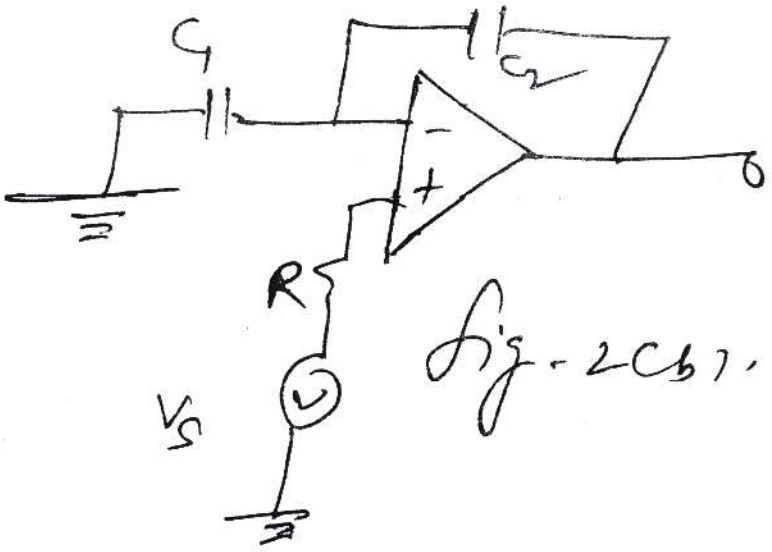


fig 2(a)



4+4=8

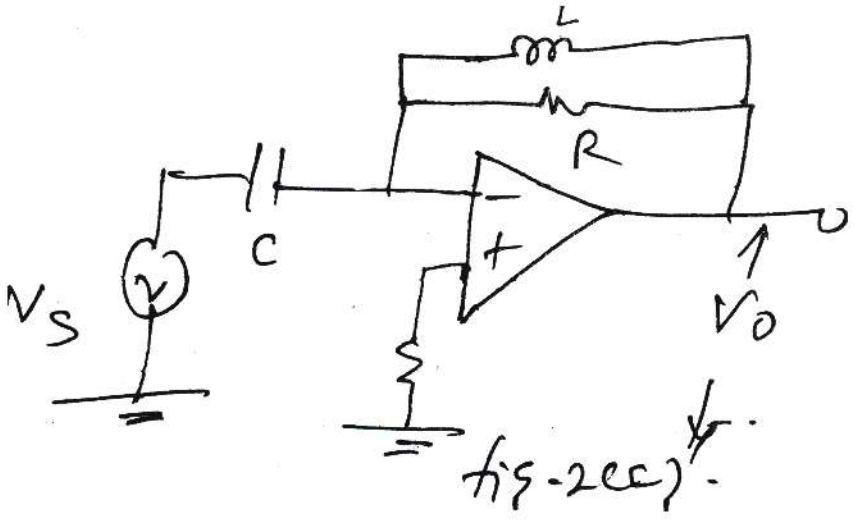
(b) Design an OP-AMP circuits to get the transfer function as

$$\frac{V_o(s)}{V_i(s)} = \frac{0.5\,s}{1+10\,s}$$

8

OR

2 (a) Find the transfer function of circuit's success in fig 2(c). Also draw it with frequency.



8

(b) Draw the circuit using OP-AMP to get a

(i) Phase shift oscillator

(ii) Precision rectifier.

8

UNIT - III

3 Draw following filters using OP-AMP.

(i) Double stage low pass

(ii) First order switched capacitor

(iii) First order All Pass filter

(iv) First order high pass (Butterwierth).

4×4=16

OR

3 Design the following active filter:

(i) First order chebyshev filter with cutoff frequency f_c = 3 kHf.

(ii) Band pass filter with f_c = 5 kHf and f_m = 20 kHz.

8+8=16

UNIT - IV

4 Draw and explain the working of following :

(i) Four quadrant multiplier

(ii) Three terminal voltage regulator

(iii) Zero crossing detector

(iv) 3 bit ADC.

4×4=16

OR

4 Design following :

(i) A square wave generator using IC 555 for generate clock of 5 kHz.

(ii) A schmitt trigger with UTP (Upper trip point) = 3.5 volt and LTP (Lower Trip Point) = 1.5 volt.

8+8=16

UNIT - V

5 (a) Draw the OP-AMP circuit for solve differential equation

$$2\frac{d_y^2}{d_t^2} + \frac{dy}{dt} + 2y = 5.$$

8

(b) Explain the working principle of PLL. How it can be used for FM detector ?

8

OR

283

5 (a) Draw the circuit diagram of an antilog amplifier and find its input output relation. **8**

(b) Draw the different building blocks of a PLL. Also find the overall transfer function of a PLL. **8**

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5E5023

Roll No. : _____

Total Printed Pages : 3

5E5023

B. Tech. (Sem. V) (Mercy Back) Examination, November 2018
Electronics & Communication Engg.
5EC3A Telecommunication Engg.

Time : 3 Hours

Total Marks : 80
Min. Passing Marks : 24

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.*

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____ 2. NIL _____

UNIT - I

1 (a) What is the meaning of standing wave patterns ? Explain it for lossless transmission line and for transmission line with attenuation. **8**

(b) A telephone line has R = 30 Ω/km, G = 0, L = 100 mH/km, and C = 20 μF/km. At f = 1 kHz, obtain following :
(i) The characteristic impedance of the line
(ii) The propagation constant. **8**

OR

207

1 (a) Describe the types of losses that may occur with high frequency transmission lines. 8

(b) A 20 km long transmission line operating at 500 MHz has following primary constants R = 0.5 Ω/m, L = 250 nH/m, C = 100 PF/m, G = 10^{-6} s/m. All constants are assumed to be independent of frequency. Calculate characteristic impedance, attenuation coefficient and phase coefficient for the line. 8

UNIT - II

2 (a) Draw a block diagram of a set up for measurement of attenuation of transmission line and explain briefly. 8

(b) What is stubs ? Describe the single and double stubs phenomena in transmission line. 8

OR

2 (a) Describe the properties and application of Smith chart used in transmission line. 8

(b) A lossless transmission line operating at 4.5 GHz has L = 2.4 μH/m and Z_o = 85Ω. Calculate the phase constant and phase velocity. 8

UNIT - III

3 (a) Derive the characteristic impedance and propagation constant of bridge-T phase equalizer network. 8

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

OR

2 8-2

3 (a) Sketch a section of m-derived band pass filter and derive the value of each component. **8**

(b) Design m-derived T-type low-pass filter to work into load of 500 Ω and cut-off frequency at 4 kHz and peak attenuation at 4.5 kHz. **8**

UNIT - IV

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

(b) Explain the function of Echo suppressors and cancellors in telephone transmission. **8**

OR

4 (a) Write a short note on two-wire and four-wire transmissions. **8**

(b) Draw and explain the signalling tones used in telephones. **8**

UNIT - V

5 Write short notes on any two :

(i) EPABX

(ii) STS and TST Switches

(iii) Fascimile Services

(iv) SPC digital telephone exchange. **16**

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5E5024

Roll No. : _____

Total Printed Pages : 4

5E5024

B. Tech. (Sem. V) (Mercy Back) Examination, November 2018
Electronics & Communication Engg.
5EC4A Analog Communication

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

*Attempt any **five** questions, selecting **one question** from **each unit**. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT - I

1 (a) Define and explain the terms : noise figure and noise temperature of a 2-port network. How are they related ? **8**

(b) A 10 kΩ and a 20 kΩ resistor are both at a room temperature of 27°C. For a 100 kHz bandwidth, determine the r.m.s. value of the thermal noise voltage across (i) each one of them, (ii) their series combination, and (iii) their parallel combination. **8**

OR

208

1 (a) Define and explain the term : "noise equivalent bandwidth of a filter". 8

(b) A source with an internal resistance of 50 Ω and an internal e.m.f. of $6\,\mu V$ is supplying the signal voltage to an amplifier that has an input resistance of 75 Ω. The amplifier has an equivalent noise resistance of 1470 Ω. For a noise bandwidth of 5 kHz, calculate the output (S/N) ratio in dB at room temperature of 290 K. 8

UNIT - II

2 (a) A carrier signal $A_c \cos \omega_c t$ is amplitude modulated by a message signal $A_m \cos \omega_m t$, where, $A_m < A_c$.

(i) Write down the expression for the modulated signal.

(ii) Write down the expression for the carrier component and the side-frequency components.

(iii) Draw the phasor diagram of the modulated signal.

8

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

OR

2 (a) State how a DSB-SC signal may be generated ? 8

(b) Write down an expression for the time-domain representation of a VSB signal. 8

289

UNIT - III

3 (a) Derive an expression for the time domain representation of a frequency modulated signal. 8

(b) A message signal, $x(t) = 100\text{sinc}2000t$ frequency modulates a carrier signal $c(t) = 200\cos 2\pi \times 10^8 t$, with a modulation index of 5.

(i) Write down an expression for $x_c(t)$, the modulated signal.

(ii) What is the bandwidth of this modulated signal ? 8

OR

3 (a) Define the term 'modulation index' for FM in the case of single-tone modulation and for a general modulating signal. 8

(b) With the help of a neat block schematic diagram, explain the indirect method of generation of WBFM signals. 8

UNIT - IV

4 (a) Draw the block diagram of the model used for the channel and the receiver to study the noise performance of various modulation systems. 8

(b) What is meant by 'threshold effect' in FM receivers ? 8

OR

4 (a) What is the model used for an envelope detector ? 8

(b) Expain the need for 'pre-emphasis and de-emphasis' in the case of FM systems. How is it implemented ? 8

290

UNIT - V

5 (a) What is 'aliasing' ? How it can be reduced or avoided ?

8

(b) State the low pass sampling theorem and briefly explain its significance.

8

OR

5 (a) Explain how a PAM signal may be generated. How can it be demodulated ?

8

(b) Describe with the help of neat sketches of waveforms, any two methods of generation of PDM/PWM and PPM.

8

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5E5034

Roll No. : _____

Total Printed Pages : 2

5E5034

B. Tech. (Sem. V) (Mercy Back) Examination, November 2018
Electronic Instrumentation & Control Engg.
5EI4A Electronic Measurement & Instrumentation

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

*Attempt any **five** questions, selecting **one question** from **each unit**. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT - I

1 (a) Explain the working of sweep frequency generator with block diagram. **8**

(b) Explain the working of indirect frequency synthesizer with block diagram. **8**

OR

1 (a) Discuss the working of hetrodyne wave analyzer with diagram. **8**

(b) Explain the working of basic spectrum analyzer in detail. **8**

UNIT - II

2 (a) Discuss the working of optical and magnetic isolators. **8**

(b) Write short note on sample and hold circuits. **8**

OR

2 Explain sampling theory and its applications in curent, voltage, power and energy measurement in detail.

16

UNIT - III

3 (a) Discuss the working of digital, storage oscilloscope.

8

(b) Explain the working of vector impedance meter with necessary diagram.

8

OR

3 Explain the working of Ramp type digital voltmeter in detail with necessary diagram.

16

UNIT - IV

4 (a) Enumerate the various time standards and discuss how the measurement of the time interval between events can be done.

8

(b) Discuss the order of events and vernier technique in detail.

8

OR

4 Discuss the high frequency measurement trechniques in detail.

16

UNIT - V

5 Discuss the procedure for calibration of plant instruments and master instruments in detail.

16

OR

5 Discuss PWM and digital telemetry schemes in detail.

16

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5E5025

Roll No. : _____

Total Printed Pages : 3

5E5025

B. Tech. (Sem. V) (Main/Back) Examination, November 2018
Microwave Engg-I

Time : 3 Hours

Total Marks : 80
Min. Passing Marks :

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.*

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT - I

1 (a) If the dimensions of the wave guide are 3.5 × 2.0 cm and the frequency of operation is 10 GHz, determine all the possible TE and TM modes that can be propagated in this wave guide. **10**

(b) What is the mode of propagation in microstrip line ? **6**

OR

1 (a) Design a 10 dB strip-line coupler at midband frequency 5 GHz with single feedline characteristic impedance Zo = 50 Ω, substrate permitivity $\varepsilon_r = 9$, substrate thickness b = 1mm. **10**

(b) Explain the advantages and disadvantages of planer transmission line. 6

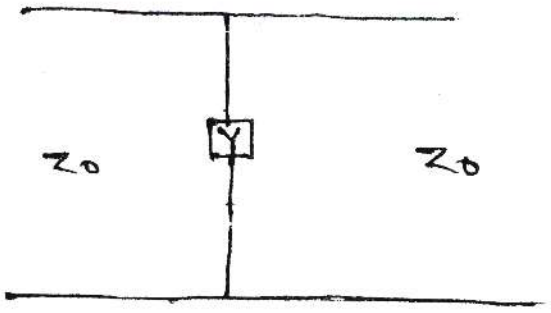
UNIT - II

2 (a) Explain Reciprocal Networks and lossless networks. 8

(b) Define briefly S matrix and S parameters. 8

OR

2 (a) Find the S-parameters of a shunt admittance Y connected between two ports as shown in fig.



10

(b) Explain Scattering Matrix of three-port networks. 6

UNIT - III

3 (a) What are lumped microstrip components ? Explain the three types of lumped components. 8

(b) Differentiate between an E-plane Tee and H-plane Tee. Describe the use of a magic tee as an isolator. 8

OR

295

3 (a) Explain the Wilkinson Power Divider for equal and unequal power splits. **8**

(b) What are the differences between Half wave resonator and Ring Resonator ? **8**

UNIT - IV

4 (a) Describe a procedure for VSWR measurement using microwave bench set up. What is double minima method ? **10**

(b) Write a short note on Network analyzer. **6**

OR

4 (a) Explain briefly different methods used for power measurement. **10**

(b) Write a short note on spectrum analyzer. **6**

UNIT - V

5 Write short notes on the following : (any two)

(i) Classification of IC

(ii) Photolithography process

(iii) Isolation Diffusion

(iv) Epitaxial growth. **2×8=16**

OR

5 (a) Describe the Microwave Monolithic Integrated Circuit (MMIC) technology and their application. **10**

(b) Write short note on thin film formation. **6**

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5E5035

Total Printed Pages : 3

Roll No. : _____

5E5035

B. Tech. (Sem. V) (Mercy Back) Examination, November 2018
Electronic Instrumentation & Control Engg.
5EI5A Microprocessors

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

*Attempt any **five** questions, selecting **one question** from **each unit**. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT - I

1 (a) Explain the various trypes of buses used in 8085 microprocessor. **8**

(b) Draw the architecture of 8085 microprocessor and explain the function of various register. **8**

OR

1 (a) Draw the pin diagram of 8085 microprocessor and explain the various pins of 8085 microprocessor. **8**

(b) Why are AD_7–AD_0 lines multiplexed ? With the help of latching circuit, explain how these lines are demultiplexed. **8**

UNIT - II

2 Explain the following instruction using suitable example :

(a) XCHG

(b) CMP

(c) DAA

(d) RET

4×4=16

OR

2 (a) Explain the various addressing modes of 8085 using suitable examples.

8

(b) Explain the role of following in 8085 microprocessor :

(i) Program counter

(ii) Stack pointer

(iii) ALE signal

(iv) READY signal.

8

UNIT - III

3 (a) What do you know about the interrupt facilities available with 8085 ?

8

(b) What are the various software interrupts of 8085 ? Give there vector location. With the help of one example illustrate its usefulness.

8

OR

3 (a) Identify the RST_n instruction if Hex code is FFH.

4

(b) Specify the cell location for the RST_n.

4

(c) If the instruction at RST_n memory location is JMP 20 BFH and service routine is written at 2075 H. What instruction is necessary at 20BFH to locate the service routine.

8

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UNIT - IV

4 (a) Draw pin diagram of 8255 and explain its various pins. 8

(b) Explain various modes of 8255. 8

OR

4 (a) Draw pin diagram of 8254 and explain its various pins. 8

(b) With the help of block diagram explain the working of DMA controller in detail. 8

UNIT - V

5 (a) Draw architecture of 8086 microprocessor and explain its various register. 8

(b) Write the short notes on 80286 microprocessor. 8

OR

5 (a) Explain addressing modes of 8086 microprocessor. 8

(b) Draw pin diagram of 8086 microprocessor and explain its vairous pins. 8

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5E5026

Roll No. : _____

Total Printed Pages : 3

5E5026

B. Tech. (Sem. V) (Mercy Back) Examination, November 2018
Electronics & Communication Engg.
5EC6.1A Biomedical Instrumentation

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

*Attempt any **five** questions, selecting **one question** from **each unit**. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT - I

1 (a) What is meant by pulmonary and systemic blood circulation ? Draw and explain the working of cardiovascular system. **2+6=8**

(b) Explain the selection criteria for transducers and electrodes used in biomedical field. **8**

OR

1 Give the brief anatomy and physiology of following human body subsystems. Also discuss the engineering analogous and variable of prime importnce for :
(a) Respiratory system
(b) Neural system **8+8**

300

UNIT - II

2 (a) What is cardic axis ? Explain the Einthoven triangle and significance of various leads.

(b) Explain the working principle of blood pressure measurement. Also draw and explain blood pressure waveform during systole and diastole. **3+5=8**

4+4=8

OR

2 (a) What is phonocardiograph ? Explain various techniques for measuring heart sounds.

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

(i) EMG biopotential

(ii) ERG biopotential

4+4=8

UNIT - III

3 (a) What do you mean by NMR signal ? Explain the working principle of Magnetic Resonance Imaging technique.

(b) Discuss the working principle of chromatographs. List their application in clinical laboratory. **8**

8

OR

3 (a) Explain the optical methods of blood pH measurement used for continuous monitoring.

(b) Describe the hematology of blood. Explain the working of a coulter model STKS type blood analyzer with the help of suitable diagram. **8**

8

301

UNIT - IV

4 (a) Draw a layout plan for a typical Intensive Care Unit (ICU). Discuss how it is beneficial ? **10**

(b) What are physiological effects of electric current on human body ? **6**

OR

4 (a) What is hemodialysis ? Explain the working of an artificial kidney with the help of block diagram. **8**

(b) Describe with help of block diagram. a multi-channel biotelemetry system. **8**

UNIT - V

5 (a) Describe the criteria for identification of cardiac disorders. **8**

(b) Explain the clinical application of EMG and ERG signals. **8**

OR

5 (a) Explain data acquisition and processing. **8**

(b) Explain remote data recording and management. **8**

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5E5038

Roll No. : _____

Total Printed Pages : 4

5E5038

B. Tech. (Sem. V) (Mercy Back) Examination, November 2018
Electronic Instrumentation & Control Engg.
5E16.3A Digital Communication

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 24

*Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.*

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL 2. NIL

UNIT-I

1 (a) Explain the quantization error and derive an expression for maximum signal to noise ratio in PCM system that uses Linear Quantization. **8**

(b) In a binary PCM system, the output signal-to-quantizing noise ratio is to be held to a minimum value of 40 dB. Determine the number of required levels, and find the corresponding output signal-to-quantizing noise ratio. **8**

OR

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1 (a) Explain a PAM/TDM system in detail with a block diagram and write briefly about the following :

(i) frame
(ii) signaling rate
(iii) transmission BW
(iv) synchronization
(v) crosstalk
(vi) guard time.

8

(b) Explain delta modulation in detail with suitable diagram. Also, explain ADM and compare its performance with DM. 8

UNIT - II

2 (a) Represent the data 10110100 using the following digital data formats with the help of neat figures:

(i) Unipolar RZ
(ii) Polar NRZ
(iii) Bipolar RZ
(iv) Split phase Manchester.

8

(b) Write a short note on Raised Cosine Spectrum.

8

OR

2 (a) What is ISI ? Explain the effect of ISI and what are the remedies to reduce it ?

8

(b) Compare the line codes with neat diagrams.

8

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UNIT - III

3 (a) Draw the block diagram of QPSK system and explain its working. 8

(b) Derive an expression for the spectrum of BFSK and sketch it for the condition of orthogonality and minimum bandwidth. 8

OR

3 (a) Explain the ASK system and derive the relation for error probability of binary ASK. 8

(b) Show that MSK has a constant envelope, stratifying from the expression of MSK. 8

UNIT - IV

4 (a) Define and explain the term information rate. State the relation between information rate and entropy. 8

(b) Given, a telegraph source having two symbols, dot and dash. The dot duration is 0.2 sec. The dash duration is 3 times the dot duration. The probability of the dot's occurring in twice that of the dash, and the time between symbols is 0.2 sec. Calculate the information rate of the telegraph source. 8

OR

4 (a) State and explain the channel coding theorem. 8

(b) Prove that the entropy is maximum when the messages are equally likely. 8

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UNIT - V

5 (a) Explain the role of minimum distance in error correction and detection. **8**

(b) Determine the Huffman code for the following messages with their probabilities given

x_1	x_2	x_3	x_4	x_5	x_6	x_7
0.05	0.15	0.2	0.05	0.15	0.3	0.1

8

OR

5 Consider a (7, 4) linear block code with the parity check matrix H given by

$$H = \begin{bmatrix} 1 & 0 & 1 & 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 1 & 0 \\ 0 & 1 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$$

Construct code words for this (7,4) code and show that this code is a Hamming code.

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