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5E1391

Roll No. _____ Total No. of Pages: 2

5E1391

B. Tech. V - Sem. (Main / Back) Exam., January - 2022
ESC Electronics & Communication Engineering
5EC3 – 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 may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

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

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[5×2=10]**

All questions are compulsory

Q.1 What is virtual memory?

Q.2 What is meant by an interleaved memory?

Q.3 Define segmentation.

Q.4 Explain input-output processor.

Q.5 Write the rules to perform addition of floating point numbers.

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PART – B

(Analytical/Problem solving questions) **[4×10=40]**

Attempt any four questions

Q.1 What are the addressing modes? Explain each in brief with diagram.

Q.2 Describe in detail about the bus arbitration techniques in DMA.

Q.3 What are the 3 different cache memory schemes? Explain in detail.

Q.4 What are the various modes of data transfer to and from the computer system? Explain.

Q.5 Explain Flynn's classification with suitable examples.

Q.6 What is the difference between cache memory & associative memory? Explain in detail.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[2×15=30]**

Attempt any two questions

Q.1 Describe different instruction formats and illustrate the same with an example.

Q.2 Describe in detail about the memory technologies.

Q.3 Write short notes on –

(a) DMA controller

(b) Stacks & queues

(c) Arithmetic pipeline

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5E1392

Roll No. _____ Total No. of Pages: 3

5E1392

B. Tech. V - Sem. (Main / Back) Exam., March - 2022
Electronics & Communication Engineering
5EC4 – 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 seven questions from Part B and attempt all four questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

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

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[10×2=20]**

All questions are compulsory

Q.1 Explain monopole and dipole antenna. [2]

Q.2 Define attenuation in waveguide. [2]

Q.3 Explain the advantage of waveguide. [2]

Q.4 Define total internal reflection. [2]

Q.5 Explain term group velocity. [2]

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Q.6 Define radiation parameter importance. [2]

Q.7 Define boundary condition and its utility. [2]

Q.8 Explain the different application of transmission line. [2]

Q.9 Explain the utility of Smith chart. [2]

Q.10 Explain the effect of characteristic impedance. [2]

PART – B

(Analytical/Problem solving questions) **[5×8=40]**

Attempt any five questions

Q.1 Explain the method of Antenna Radiation for Hertz dipole. [8]

Q.2 What is uniform plane wave? Show that the field in the uniform plane wave is independent of two dimensions. [8]

Q.3 What is the significance of the Maxwell's equations? Mention them in their various forms. [8]

Q.4 Discuss the different types of transmission lines and their applications. [8]

Q.5 For a transmission line which is terminated in normalized impedance Zn, VSWR = 2? Find the normalized impedance magnitude. [8]

Q.6 Discuss the Degenerated and Dominant modes in a rectangular waveguide. [8]

Q.7 Derive an expression for the fields in rectangular waveguide in case of Transverse Magnetic (TM) wave. [8]

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PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[4×15=60]**

Attempt all four questions

Q.1 An air filled rectangular wave guide of inside dimension 7 × 3.5cm operates in the dominant TE_{10} mode – [15]

(i) Find the cut off frequency.

(ii) Determine the phase velocity of the wave in the guide at a frequency of 3.5GHz.

(iii) Determine the guided wave length at the same frequency.

Q.2 (a) Describe the Smith chart and its application in analysis of transmission line. [7]

(b) A transmission line has characteristics impedance of 50 + i0.01Ω and is terminated in a load impedance of 73- i42.5Ω. Calculate reflection coefficient and standing-wave ratio. [8]

Q.3 (a) Explain the radiation solution for potential function. [7]

(b) Explain the basic laws of electromagnetism. [8]

Q.4 (a) Explain the propagation of wave and their types. [7]

(b) Explain wave propagation in conducting medium and derive expression for phase and group velocity. [8]

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5E1393

Roll No. _____ Total No. of Pages: 4

5E1393

B. Tech. V - Sem. (Main / Back) Exam., March - 2022
Electronics & Communication Engineering
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 may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

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

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[10×2=20]**

All questions are compulsory

Q.1 Define forward path and forward path gain.

Q.2 Differentiate closed loop and open loop control system.

Q.3 State Mason's gain formula.

Q.4 What is meant by steady state error?

Q.5 List the main properties of a state transition matrix.

Q.6 State the necessary condition for stability.

Q.7 What are the characteristics of phase-lead network?

Q.8 What is dominant pole?

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Q.9 What are constant M and N circle?

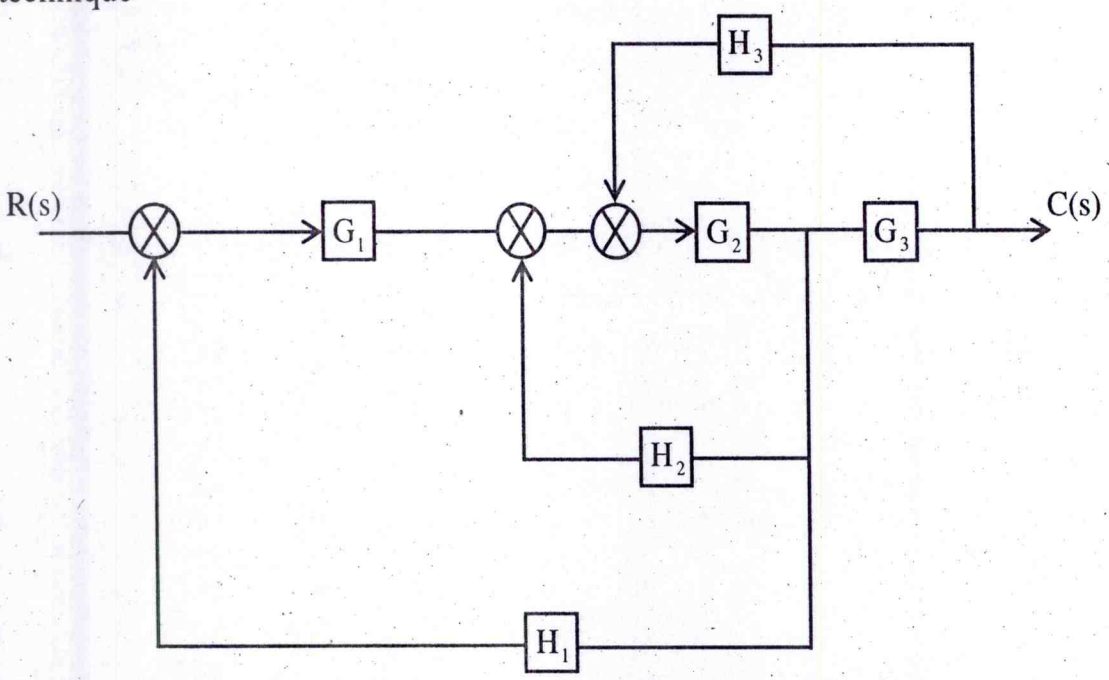
Q.10 What is the value of gain K at any given point on the root locus?

PART – B

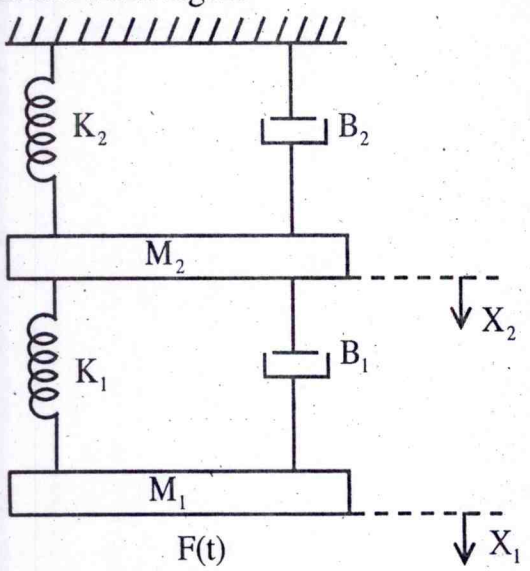
(Analytical/Problem solving questions) **[5×8=40]**

Attempt any five questions

Q.1 Find the transfer function of the system shown in fig. using block diagram reduction technique -



Q.2 Obtain the differential equations describing the complete dynamics of the mechanical system shown in figure -



Q.3 A servomechanism is represented by the equation -

$$\frac{d^2\theta}{dt^2} + 10\frac{d\theta}{dt} = 150E$$

Where E = (r - θ) is the actuating signal. Calculate the value of damping ratio, undamped frequency of oscillations.

Q.4 Comment on the stability of the system whose characteristic equation is given below -

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

Q.5 Compare PI, PD and PID controllers.

Q.6 Check for controllability and observability of a system having following coefficient matrixes -

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix}, B = \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix} \text{ and } C^T = \begin{bmatrix} 10 \\ 5 \\ 1 \end{bmatrix}$$

Q.7 Explain regulator problem and tracking problem in detail.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[4×15=60]**

Attempt any four questions

Q.1 A certain feedback control system is described by the following transfer function -

$$G(s) = \frac{k}{s^2(s+20)(s+30)}, H(s) = 1$$

(a) Determine steady state error coefficients.

(b) Also determine the value of K to limit the steady state error to 10 units due to input.

$r(t) = 1 + 10t + 20t^2$

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Q.2 Draw the Root locus plot by unity feedback system with an open loop transfer function as K is varied from 0 to ∞ -

$$G(s)\,H(s) = \frac{k}{s(s+3)(s^2+2s+2)}$$

Q.3 Draw the Nyquist plot of open loop transfer function -

$$G(s)\,H(s) = \frac{k}{s(T_s+1)}$$

Also, determine whether the system is stable or not.

Q.4 Sketch the asymptotic Bode Plot for the transfer function given below -

$$G(s)\,H(s) = \frac{2(s+0.25)}{s^2\,(s+1)(s+0.5)}$$

From the Bode plot determine –

(a) the phase cross-over frequency

(b) the gain cross-over frequency

(c) the gain margin and

(d) the phase margin

Is the system stable?

Q.5 Consider a unity feedback system having open loop transfer function -

$$G(s) = \frac{1}{(s^2+10s+15)}$$

Calculate rise time, peak time, peak overshoot and settling time.

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5E1394

Roll No. _____ Total No. of Pages: 3

5E1394

B. Tech. V - Sem. (Main / Back) Exam., January - 2022
Electronics & Communication Engineering
5EC4 – 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 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 may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

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

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[10×2=20]**

All questions are compulsory

Q.1 Why the ROC of z-transform cannot contain any poles?

Q.2 Give the computational efficiency of FFT over DFT.

Q.3 Give the various steps involved in the design of FIR filter.

Q.4 Explain limit cycles in filters.

Q.5 Using final value theorem, find the steady state value of $x(n) = [(0.5)^n - 0.5]U(n)$.

Q.6 What is the difference between energy and power signal?

Q.7 List the basic elements of digital signal processing.

Q.8 What is the importance of sampling theorem?

Q.9 What is Gibbs phenomenon?

Q.10 Give two advantages of digital signal processing over an analog signal processing.

PART – B

(Analytical/Problem solving questions) **[5×8=40]**

Attempt any five questions

Q.1 Explain the divide and conquer approach for calculation of DFT. Describe radix-2 DIT – FFT algorithm.

Q.2 Determine the causal signal x(n), if the z - transform x(z) is given by -

$$x(z) = \frac{2-1.5\,z^{-1}}{1-1.5\,z^{-1}+0.5\,z^{-2}}$$

Q.3 The system function of an analog filter is as given -

$$H_a(s) = \frac{s+0.1}{(s+0.1)^2+9}$$

Obtain the system function of IIR digital filter using impulse invariance method.

Q.4 Explain parametric and nonparametric spectral estimation in digital signal processing.

Q.5 Find the DFT of the sequence -

$$x(n) = \begin{cases} 1 \; ; & 2 \le n \le 6 \\ 0 \; ; & n = 0,1,7,8,9 \end{cases}$$

Given N = 10

Q.6 An analog signal is expressed by the equation -

$$x(t) = 3\cos(50\pi t) + 2\sin(300\pi t) - 4\cos(100\pi t)$$

What is the Nyquist rate for this signal? If the signal is sampled with sampling frequency of 200 Hz, what will be the DT signal obtained after sampling? What will be the recovered signal?

Q.7 Define the convolution. What is the difference between the linear and circular convolution?

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PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[4×15=60]**

Attempt any four questions

Q.1 Compute the DFT of the data sequence $x(n) = \{1,1,2,2,3,3\}$ and also compute the corresponding amplitude and phase spectrum.

Q.2 Design a FIR lowpass filter using Kaiser Window, whose filter specifications are given as follow -

Passband attenuation α_P	=	1 dB
Passband attenuation α_S	=	39 dB
Passband frequency	=	20 rad/sec.
Stopband frequency	=	40 rad/sec.
Sampling frequency	=	100 rad/sec.

Q.3 Obtain the cascade realization of the system described by the difference equation -

$$y(n) + \frac{1}{16}y(n-1) + \frac{1}{6}y(n-2) - \frac{1}{24}y(n-3) - \frac{1}{16}y(n-4) = x(n) + \frac{5}{6}x(n-1) + x(n-2) + \frac{13}{36}x(x-3) + \frac{1}{6}x(n-4)$$

Q.4 Consider a causal and stable LTI system which is characterized by LCCD equation -

$$y(n) - \frac{1}{6}y(n-1) - \frac{1}{6}y(n-2) = x(n)$$

Compute:

(i) Frequency response of the system, $H(e^{iG})$.

(ii) The impulse response h(n) of the system.

(iii) The system output for the input $\left(\frac{1}{4}\right)^n u(n)$.

Q.5 Compute 8– point DFT of the sequence $x(n) = 2^n$ using DIT – FFT algorithm.

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5E1395

Roll No. _____ Total No. of Pages: 2

5E1395

B. Tech. V - Sem. (Main / Back) Exam., March - 2022
Electronics & Communication Engineering
5EC4 – 05 Microwave Theory & 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 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 may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

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

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[10×2=20]**

All questions are compulsory

Q.1 If a microwave having a frequency of 10 GHz is moving out with speed of light, calculate the corresponding wavelength.

Q.2 Write down the name of various losses in a microstrip line.

Q.3 Define faraday rotation.

Q.4 What is velocity modulation?

Q.5 Write down the S – matrix of a two port network.

Q.6 What is slow wave structure?

Q.7 What is Gunn effect?

Q.8 What are the basic materials used for MMICs?

Q.9 What is a Bolometer?

Q.10 Write the applications of CW radar.

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PART – B

(Analytical/Problem solving questions) **[5×8=40]**

Attempt any five questions

Q.1 A transmission line of characteristics impedance 100 Ω is connected to a load of 200 Ω. Calculate reflection coefficient and standing wave ratio.

Q.2 An air filled rectangular waveguide has dimensions a = 6 cm and b = 4 cm. The signal frequency is 4 GHz. Compute the cut – off frequency for the TE_{10}, TE_{01}, TE_{11}, and TM_{11} modes.

Q.3 What is magic associated with a Magic Tee? Draw a neat sketch of a Magic Tee and list out its application and properties.

Q.4 Derive the equation of velocity modulation for a two – cavity Klystron amplifier.

Q.5 What is a PIN diode? Describe the construction of a PIN diode and also its characteristics.

Q.6 Draw the block diagram of a radar and explain each block.

Q.7 Explain the antenna performance parameters.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[4×15=60]**

Attempt any four questions

Q.1 For a 2 – port network, define the s – parameters involved, and obtain the relations for insertion loss, reflection loss, and return loss in terms of s – parameters.

Q.2 A linear magnetron has the following operating parameters V_0 = 15 KV, I_0 = 1.2 A, f = 8 GHz, B_0 = 0.015 wb/m^2, d = 5 cm and h = 2.77 cm. Calculate –

(a) Electron velocity at hub surface

(b) Phase velocity for synchronics

(iii) Hatree anode voltage

Q.3 Explain the construction, fabrication and encapsulation of Gunn diodes. Mention the typical characteristic and application of Gunn diode.

Q.4 Design a maximally flat low pass filter with a cutoff frequency of 24 Hz, impedance of 50 Ω, and at least 15 dB insertion loss at 3 GHz.

Q.5 Write down the complete procedure with block diagram for measurement of microwave antenna parameters.

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5E1396

Roll No. _____ Total No. of Pages: 2

5E1396

B. Tech. V - Sem. (Main / Back) Exam., March - 2022
PCC/PEC Electronics & Communication Engineering
5EC5 – 11 Bio-Medical Electronics

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 may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

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

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[5×2=10]**

All questions are compulsory

Q.1 What are the selection factors of transducers for bio-medical applications? [2]

Q.2 What do you mean by EMG? Draw its waveform. [2]

Q.3 Draw the basic diagram of pacemakers. [2]

Q.4 Explain the applications, merits and demerits of Plethysmography. [2]

Q.5 What do you mean by neuron potential? [2]

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PART – B

(Analytical/Problem solving questions) **[4×10=40]**

Attempt any four questions

Q.1 Explain the utility of bio-electrodes in medical field. How will you calibrate the bio-medical transducers? [10]

Q.2 Explain the construction and working of dissolved ions and gases measurement transducers with merits & demerits. [10]

Q.3 Explain the nuclear imaging techniques in bio-medical field. [10]

Q.4 Explain the following transducers used in bio-medical field – [10]

(a) Acceleration transducers

(b) Flow transducers

Q.5 Explain the various transmission modes of ultrasound in detail. [10]

Q.6 What do you mean by EEG? Explain its waveform and working with applications. [10]

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[2×15=30]**

Attempt any two questions

Q.1 Explain the construction and working of Heart-Lung Machine (HLM) and state its applications, merits and limitations. Justify the scenarios where HLM can be used. [15]

Q.2 Explain the construction and working of defibrillators with suitable diagram, applications and precautions. [15]

Q.3 What are the physiological effects of electric current shock hazards from electrical equipment's? Explain its safety measures. [15]

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5E1398

Roll No. _____ Total No. of Pages: 2

5E1398

B. Tech. V - Sem. (Main / Back) Exam., March - 2022
PCC/PEC Electronics & Communication Engineering
5EC5 – 14 Satellite Communication

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 may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

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

1. NIL 2. NIL

PART – A

(Answer should be given up to 25 words only) **[5×2=10]**

All questions are compulsory

Q.1 What is Doppler frequency shift? [2]

Q.2 Define CDMA Technique. [2]

Q.3 Define the flux density. [2]

Q.4 Give the Kepler's law. [2]

Q.5 What are the advantages of Satellite? [2]

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PART – B

(Analytical/Problem solving questions) **[4×10=40]**

Attempt any four questions

Q.1 Explain in detail –

(i) Calculation of system noise temperature for satellite receiver [5]

(ii) Noise power calculation. [5]

Q.2 Differentiate between TDMA, FDMA and CDMA techniques. [10]

Q.3 Write short notes on -

(i) Satellite Link Budget [5]

(ii) Sun transit outage phenomena [5]

Q.4 With the brief history of satellite systems, explain the principle and architecture of satellite communication systems. [10]

Q.5 Explain with suitable diagram apogee and perigee for an elliptical orbit. Also define the orbital period and angular velocity. [10]

Q.6 (a) Explain the terms – [5]

(i) C/N ratio

(ii) Noise temperature

(b) For a given satellite system, the ratios of individual link C/N spectral density uplink is 100 dB Hz, downlink 47 dB Hz. Calculate the combined 'C/N' ratio. [5]

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[2×15=30]**

Attempt any two questions

Q.1 (a) With a neat diagram, explain the power budget for a satellite link considering back off and rain fade margin. [10]

(b) Give remedies for Eclipse. [5]

Q.2 (a) Give the concept of solar day and sidereal day. [7]

(b) Give the applications and frequency bands used for satellite communication. [8]

Q.3 How does the system noise temperature affects the performance? Derive the expression for overall system noise temperature at the receiving earth station. [15]

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5E5021

Roll No. _____ Total No. of Pages: 3

5E5021

B. Tech. V - Sem. (Back) Exam., January - 2022
Electronic Instrumentation & Control Engineering
5EI1A Signals & Systems
EC, EI

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.

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

1. NIL 2. NIL

UNIT- I

Q.1 Find which of the following signals are causal or non-causal -

(i) $x(t) = e^{2t} u(t - 1)$ [4]

(ii) $x(t) = \cos 2t$ [4]

(iii) $x(t) = 2 u(-t)$ [4]

(iv) $x(n) = u(n + 4) - u(n - 2)$ [4]

OR

Q.1 (a) What is convolution? Explain time convolution and frequency convolution theorems. [8]

(b) What is an LTI system? Explain the various properties of LTI system. [8]

UNIT- II

Q.2 (a) Find the Fourier transform of a rectangular pulse given by $x(t) = 1$ for $0 < t < T$; 0 elsewhere. [8]

(b) Compare Fourier transform with Fourier series. [8]

OR

Q.2 (a) Find the Fourier transform of $\cos\omega_0 t$ and sketch its spectrum. [8]

(b) Find the inverse DTFT . $X(e^{j\omega}) = 2\sin 2\omega$, $-\pi<\omega<\pi$. [8]

UNIT- III

Q.3 (a) What is DTFT? Discuss various properties of DTFT. [8]

(b) Determine CTFT of the following signal $x(t) = \{A; \text{for } -\frac{\tau}{2} \le t \le \frac{\tau}{2}$ [8]

$\{0;$ elsewhere

OR

Q.3 (a) Find the DTFT of - [8]

(i) $x(n) = \left(\frac{1}{3}\right)^n u(n+3)$

(ii) $x(n) = \left(\frac{1}{2}\right)^n$ for n = 0,2,4.....

$= 0$ otherwise

(b) What is CTFT? Discuss various properties of CTFT. [8]

UNIT- IV

Q.4 (a) Discuss the properties of Laplace Transform. For a LTI system, the impulse response $h(t) = u(t)$. Also find: Stability of the system. [8]

(b) Find the inverse Laplace Transform of X(S): [8]

$$X(S) = 2S + \frac{4}{S^2} + 4S + 3, \; -3 < \text{Re}(s) < -1$$

OR

Q.4 (a) Determine the response of the system - [8]

$y(n)=\frac{5}{6}y(n-1)-\frac{1}{6}y(n-2)+x(n)$ to the input signal

$x(n)=\delta(n)-\frac{1}{3}\delta(n-1)$ with the help of Z-Transform.

(b) Determine the inverse Z-Transform of $X(Z) = \ln(1 + az^{-1})$: ROC $|Z| > a$. [8]

UNIT- V

Q.5 (a) What is sampling theorem? Derive the expression for band limited and band pass signal. [8]

(b) What is Aliasing? Explain in detail with spectral details of a sample data. [8]

OR

Q.5 (a) State and prove the sampling theorem in time domain. [8]

(b) The signal $x(t) = 10\cos(10\pi t)$ is sampled at a rate 8 samples per second. Plot the amplitude spectrum for $|\Omega| \leq 30\pi$. Can the original signal can be recovered from samples? [8]

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5E5022

Roll No. _____ Total No. of Pages: 4

5E5022

B. Tech. V - Sem. (Back) Exam., January - 2022
Electronic Instrumentation & Control Engineering
5EI2A Linear Integrated Circuit
EC, EI

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.

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

1. NIL 2. NIL

UNIT- I

Q.1 (a) Explain the function of all the basic building block of OP-AMP. [4]

(b) Explain the concept of current mirror circuit. [4]

(c) For a differential amplifier circuit operated from ±5V, assume V_{BE} = 0.7 V and h_{fe} =100. If R_C for each is 100kΩ, calculate emitter voltage for each transistor is 4V. [8]

OR

Q.1 (a) Draw circuit diagram of a dual balanced output differential amplifier and perform its DC analysis. [8]

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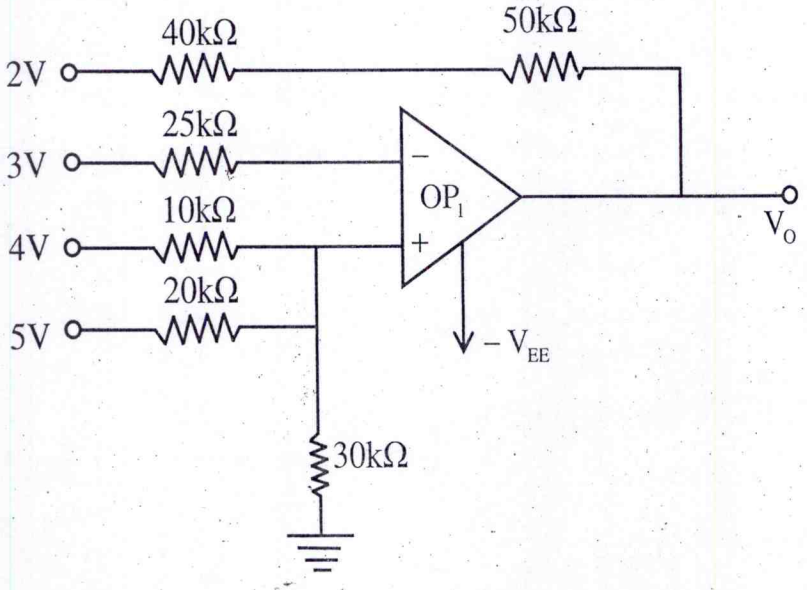
(b) An inverting amplifier has $R_F = 500k\Omega$ and $R_1 = 5k\Omega$. Determine the amplifier circuit voltage gain, input resistance and output resistance. Also determine the output voltage and input current, if the input voltage is 0.1 V. Assume OP-AMP to be ideal one. [8]

UNIT- II

Q.2 (a) Find the output voltage for the figure shown below- [12]



(b) What is voltage controlled oscillator? Give two application of VCO? [4]

OR

Q.2 (a) Design a practical integrator to integrate a signal which is having 1 kHz frequency. The break frequency are given below - [12]

$f_a = 20$ kHz, $f_b = 100$ kHz

(b) What is an oscillator? Explain phase shift oscillator. [4]

UNIT- III

Q.3 (a) Draw and explain the suitable circuit diagram of band reject filter using IC741. [6]

(b) In the basic low pass filter R = 158kΩ, C = 1nF. Find the output voltage V_0 of the filter when input signal of 1V peak to peak is applied to it at -

(i) 100Hz (ii) 10,000Hz [10]

OR

Q.3 (a) What are switched capacitor filter? Why do you need switched capacitor filter when you have conventional filter? [6]

(b) In a first order high pass active filter, prove that the following relation - [10]

$$\left|\frac{V_o}{V_{in}}\right| = \frac{A_f(f/f_L)}{\sqrt{1+(f/f_L)^2}}$$

Where A_f = pass band gain of the filter. How the frequency response of first order filter may be improved in second order filter?

UNIT- IV

Q.4 (a) Explain astable multivibrator using IC555. Also, draw waveform of output. [8]

(b) In the Schmitt trigger circuit $R_1 = 100\Omega$, $R_2 = 56k\Omega$, $V_{in} = 2V$ peak to peak sine wave and the power supply voltage is ±15V. Determine the upper and lower threshold voltage V_{UT} and V_{IT}. The max output voltage swing is ±14V. [8]

OR

Q.4 (a) Explain zero crossing detector using positive feedback. [8]

(b) Design a regulated power supply of ± 5V using filter and three terminal voltage regulated I.C. Also, mention the value of capacitance for filtering. [8]

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UNIT- V

Q.5 (a) Explain the application of PLL as - [8]

(i) FM detector

(ii) FSK Demodulator

(iii) Frequency translator

(iv) Phase Shifter

(b) A PLL has a VCO with the gain of 50 kHz/V and free running frequency of 80 kHz. The gain of forward loop is 2 and the phase detector has a maximum output voltage swing of ± 0.5 V. Determine the lock range of the PLL. Assume the filter gain to unity. [8]

OR

Q.5 (a) What is frequency synthesizer and also explain direct and indirect synthesizer? [8]

(b) What is capture range and lock range? Why capture range is always less than the lock range? [8]

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5E5023

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5E5023

B. Tech. V - Sem. (Back) Exam., March - 2022
Electronics & Communication Engineering
5EC3A Telecommunication Engg.

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.

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

1. NIL 2. NIL

UNIT- I

Q.1 (a) A distortionless line has $Z_0 = 60\ \Omega$, $\alpha = 20$ mNp/m, $u = 0.6\ c$, where "C" is the speed of light in a vacuum. Find R, L, G, C and λ at 100 MHz. [8]

(b) Explain the meaning of standing wave patterns. Discuss it for lossless transmission line and for transmission line with attenuation. [8]

OR

Q.1 (a) A telephone line has R = 30 Ω/km, L = 100 mH/km, G = 0, c= 20 μF/km at f= 1 kHz. Obtain - [10]

(i) The characteristic impendence of line

(ii) The propagation constant

(iii) The phase velocity

(b) Derive the expression for the input impedance of quarter wave line. [6]

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UNIT- II

Q.2 (a) A 50 Ω lossless line in terminated in a load impedance $Z_L = (30 - J\,60)\ \Omega$. The wave-length is 5 cm, find the following - [8]

(i) Reflection coefficient at the load

(ii) SWR on the line

(iii) Position of V_{max} nearest the load

(iv) Position of I_{max} nearest the load

(b) Describe the single and double stub matching. [8]

OR

Q.2 (a) Describe the smith chart and its applications in analysis of transmission line. [8]

(b) An open wire R.F. transmission line (loss free) has a $Z_0 = 600\ \Omega$ is connected to resistive load of 100Ω. Find the position and length of short circuited stub. If frequency is 150 Hz. [8]

UNIT- III

Q.3 (a) Explain various types of filters. Also explain low pass constant – k filter and high pass constant – k filter with suitable diagrams and equations. [8]

(b) Design the following attenuators to have an attenuation of 40 dB and design impedance 300Ω. [8]

(i) Symmetrical lattice attenuator

(ii) Symmetrical Bridge T – attenuator

OR

Q.3 (a) Describe Π – section and T – section attenuator. [8]

(b) Show that for a band pass fitter, the series and shunt arm resonant frequency in the Geometric mean of two cut – off frequencies 'f_1' & 'f_2' deciding pass band. [8]

1B3

UNIT- IV

Q.4 (a) Compare TDM & FDM. Suggest which multiplexing system being used in general & why? [8]

(b) Write a short note on two-wire & four-wire transmission. [8]

OR

Q.4 (a) Explain briefly the following terms used in telephony - [8]

(i) Busy hour

(ii) Holding time

(iii) Traffic unit

(iv) Grade of service

(b) Draw the block diagram of a modern telephone instrument and explain its working. [8]

UNIT- V

Q.5 Write short note on any four of the following - [16]

(i) Facsimile services

(ii) STS & TST Switching

(iii) SPC digital telephone exchange

(iv) Trucking concepts and Grade of service

(v) Numbering plan of telephone exchange

OR

Q.5 (a) Give classification of switching systems and explain principle of operation of electronic exchange. [10]

(b) Write a short note on EPABX system. [6]

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5E5024

Roll No. _____ Total No. of Pages: 3

5E5024

B. Tech. V - Sem. (Back) Exam., March - 2022
Electronics & Communication Engineering
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.

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

1. NIL 2. NIL

UNIT- I

Q.1 (a) What are the external source of noise? Compare these source with internal noise sources in respect to their voltage level, band width and coupling in communication system. [10]

(b) Find the overall noise figure of a three stage cascaded amplifier, each stage having a power gain of 10dB and noise figure of 6dB. [6]

OR

Q.1 (a) Explain using mathematical equation noise temperature and noise figure in communication system. [10]

(b) 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 overall loss is limited to 20dB. Find amplifier gain. [6]

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UNIT- II

Q.2 (a) Explain with suitable sketch and plot the generation of SSB signal using phase-shift method. [8]

(b) Obtain a relationship between carrier and side band powers in DSB-SC wave and explain, how power distribution takes place in DSB-SC system. [8]

OR

Q.2 (a) Explain with the help of neat sketch the working of super heterodyne receiver. Also, how tracking is carried out? [8]

(b) The total power content of an AM signal is 2000 W. Determine the power transmitted at one carrier frequency and at each the side band, when the present modulation is 100%. [8]

UNIT- III

Q.3 (a) With supporting equation and block diagram. Explain, how the PM can be obtained by using FM? [8]

(b) Explain the FM demodulation using PLL, with a block diagram. [8]

OR

Q.3 (a) What is the difference between direct and indirect method of FM generation? Explain each method and compare them in respect of circuit complexity and performance. [8]

(b) Find the carrier and modulating frequencies the modulation index and the maximum deviation of the FM wave represented by the equation.

$$e = 12 \sin (6 \times 10^8 t + 5 \sin 1250) t$$

What power will this FM wave dissipate in a 10Ω resistor? [8]

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UNIT- IV

Q.4 (a) Explain with circuit diagrams and response the pre-emphasis and de-emphasis in FM. Also write need for pre-emphasis and de-emphasis in FM. [10]

(b) An angle modulated signal with carrier frequency $\omega_c = 2\times10^6$ rad/sec is given by –

$S(t) = \cos 2\pi(2\times10^6 t + 30 \sin 150t + 40 \cos 150t)$, then- [6]

(i) Determine the maximum frequency deviation.

(ii) Find maximum phase deviation.

(iii) Find the bandwidth of S(t).

OR

Q.4 (a) What is threshold effect? [4]

(b) How is an angle modulation system SNR is calculated. [6]

(c) Define noise in CW and discrete system. [6]

UNIT- V

Q.5 (a) For a Pulse Amplitude Modulated (PAM) transmission of voice signal having maximum frequency equal to $f_m = 3$ kHz, calculate the transmission bandwidth it is given that the sampling frequency $f_s = 8$ kHz and pulse duration $\tau = 0.1\ T_s$. [8]

(b) Explain, how a PAM signal may be generated? How it can be demodulated? [8]

OR

Q.5 Write short note on any two – [8+8=16]

(a) Natural sampling

(b) Noise in PWM

(c) Demodulation of PPM

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5E5025

Roll No. _____ Total No. of Pages: 2

5E5025

B. Tech. V - Sem. (Back) Exam., January - 2022
Electronics & Communication Engineering
5EC5A Microwave Engg. - I

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.

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

1. NIL 2. NIL

UNIT- I

Q.1 (a) Draw the structure of slot and coplanar lines and their electric field lines. Also discuss the frequency range and its use in MMICs. [8]

(b) Find the wave impedance and Power flow in TE_{mn} mode inside a rectangular wave guide. [8]

OR

Q.1 (a) Find the expression of EM field inside a rectangular wave when TE mode propagate in it. [10]

(b) Draw TE_{10} and TE_{21} mode field line inside a rectangular waveguide. [3+3=6]

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UNIT- II

Q.2 Define S-Parameter of a two port MW network and find their interrelation with ABCD parameter if S-parameter are $S_{11} = S_{22} = 100\angle 90°$ and $S_{12} = S_{21} = 0.4\angle 30°$ then calculate its ABCD Parameter. [16]

OR

Q.2 Define and find the conditions of (i) Reciprocal N/W and (ii) Loss less N/W in terms of S-parameter. Also discuss any example of a MW N/W which has this property. [16]

UNIT- III

Q.3 Draw the structure and their working of (i) Branch line coupler and (ii) Wilkinson for power divider. Design a power divider that divide the I/P power in 1:3 ratio. [5+5+6=16]

OR

Q.3 Draw the structure of first order low pass and high pass filter in microstrip line. Design such low pass filter whose cut-off Frequency is 30 GHz. [5+5+6=16]

UNIT- IV

Q.4 Draw the schematic of MW power measurement technique when the level of MW power is (i) below 1 Watt and (ii) above 1 M Watt. [8+8=16]

OR

Q.4 How network analyzer is used for (i) device characterization and for (ii) measure VSWR. [8+8=16]

UNIT- V

Q.5 Write Short notes on any two - [8+8=16]

(i) MMIC

(ii) MIC technology

(iii) Deposition in photolithography

(iv) Comparison between Hybrid and Monolithic Circuits
