5E1780

Roll No. _____ Total No. of Pages: 2

5E1780

B. Tech. V - Sem. (Main) Exam., February - 2023
Electronics & Communication Engineering
5EC3 – 01 Computer Architecture

Time: 3 Hours **Maximum Marks: 70**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three 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 What is the difference between machine and instruction cycles?

Q.2 What are memory reference instruction?

Q.3 Discuss addressing mode.

Q.4 Differentiate between computer architecture and computer organization.

Q.5 Explain in brief about main memory.

Q.6 What is a priority interrupt?

Q.7 Explain the concept of pipelining.

Q.8 What are peripheral devices?

Q.9 Define Micro-operation with example.

Q.10 What is the advantage of relative addressing mode?

PART – B

(Analytical/Problem solving questions) **[5×4=20]**

Attempt any five questions

Q.1 Explain all the phases of instruction cycle.

Q.2 Explain the operation of DMA using a block diagram with a suitable example.

Q.3 Write a detailed note on I /o interface.

Q.4 What is virtual memory?

Q.5 Explain the design of ALU in detail.

Q.6 Describe the techniques for handling control hazards in pipelining.

Q.7 What is Que? Explain different types of 'Ques' used in computer architecture.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[3×10=30]**

Attempt any three questions

Q.1 Explain the design of programmed control unit in detail.

Q.2 Explain the various mapping techniques associated with cache memories.

Q.3 Elaborate on the various memory technologies and its relevance.

Q.4 Explain how floating point addition is carried out in a computer system. Give an example for a binary floating point addition.

Q.5 Write short notes on -

(a) Parallel Processing

(b) Micro instruction

(c) Hard wired control design method

5E1391

Roll No. _____ Total No. of Pages: 2

5E1391

B. Tech. V - Sem. (Back) Exam., February - 2023
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 Define Subroutines.

Q.2 Name various components of processor organization.

Q.3 Mention various phases in executing an instruction.

Q.4 Define the concept of cache memory.

Q.5 What is DMA?

PART – B

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

Attempt any four questions

Q.1 Explain various types of instructions in detail.

Q.2 Explain arithmetic and logical unit design.

Q.3 Differentiate Micro-programmed control and Hardwired control design.

Q.4 Explain the concept of virtual memory in detail.

Q.5 What is Interconnect Network? Explain in detail.

Q.6 Explain the concept of parallel processing in detail.

PART – C

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

Attempt any two questions

Q.1 Consider a 4 segment (Fetch, decode, execute & store result) instruction pipeline specify what operations are performed in the four segment during executing the following program -

Load R1 ← M[312]

ADD R2 ← R2 + M[312]

INC R3 ← R3 + 1

STORE M[314] ← R3

Q.2 Explain the following terms -

(a) Cacheable versus Non-Cacheable data

(b) Factors effecting cache hit ratios

(c) Floating point arithmetics

Q.3 What are addressing modes? Explain various types of addressing modes with the help of appropriate example.

5E5021

Roll No. _____ Total No. of Pages: 2

5E5021

B. Tech. V - Sem. (Back) Exam., February - 2023
Electronic Instrumentation & Control Engineering
5EI1A Signal & System
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 Differentiate between following -

(a) Continuous time and discrete time signal [4]

(b) Deterministic and random signal [4]

(c) Periodic and aperiodic signal [4]

(d) Time variant and time invariant system [4]

OR

Q.1 Let x(t) be the input to the LTI system with unit impulse response h(t), where $x(t) = e^{2t}\, u(-t)$ and $h(t) = u(t-3)$. Find the corresponding output y(t) using convolution. [16]

UNIT- II

Q.2 Calculate the Exponential Fourier series coefficient of the signal - [16]

$x(t) = \cos^2 [4(t)] + \sin^2 (2t)$

OR

Q.2 Compute the Fourier series of the function - [16]

$f(n) = \sin 2x + \sin^2 x$

on the interval $-\pi < n < \pi$

UNIT- III

Q.3 Find the Fourier transform of following function -

(a) $f(t) = e^{-a|t|}$ Where $a > 0$ [8]

(b) $f(t) = \frac{1}{a + jt}$ [8]

OR

Q.3 Find the Fourier transform of function $f(x) = t^2 e^{-|x|}$ [16]

UNIT- IV

Q.4 (a) Find the Z-Transform of signal $x(n) = 2^n \cos(wn)$ [8]

(b) A signal $x(t)$ is defined as $x(t) = e^{-t} u(t)$, then find the inverse Laplace transfer of $x(25)$. [8]

OR

Q.4 Write down the properties of Z-Transform. What is the region of convergence (ROC). Write down the properties of ROC. [16]

UNIT- V

Q.5 Find out the Nyquist sampling interval for the following signals -

(a) $f(t) = \text{sinc}(700t) + \text{sinc}(500t)$ [8]

(b) $f(t) = 3\sin(8\pi t) + 6\sin(12\pi t) + \sin(14\pi t)$ [8]

OR

Q.5 Find out the Nyquist sampling rate for the following signals - [16]

(a) $x(t) = 1 + \cos(200\pi t) + \sin(400\pi t)$

(b) $x(t) = \frac{\sin(400\pi t)}{\pi t}$

(c) $x(t) = \left[\frac{\sin(400\pi t)}{\pi t}\right]^2$

5E1781

Roll No. _____ Total No. of Pages: 3

5E1781

B. Tech. V - Sem. (Main) Exam., February - 2023
Electronics & Communication Engineering
5EC4 – 02 Electromagnetics Waves

Time: 3 Hours **Maximum Marks: 70**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three 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 Write the name of all four primary parameter of transmission line.

Q.2 Draw the approximate equivalent circuit of transmission line at RF.

Q.3 If a transmission line 7 characteristics impedance 20 – j50 is terminated to a load of 50 + j20, then calculate its reflection & transmission coefficient.

Q.4 On normal incidence of EM wave to a conductor surface which component of electric field remains continue?

Q.5 Find the frequency of dominant mode in a rectangular waveguide (air) of 20 cm × 40 cm cross section with a TE mode.

Q.6 Write two Maxwell equation of magnetic field for static condition.

Q.7 Calculate the length of a Hertz antenna at 30 GHz.

Q.8 Write relation between group & phase velocity.

Q.9 Draw the equivalent circuit of a open circuit transmission line of $\frac{\lambda}{2}$ length.

Q.10 Write one advantage of mono pole antenna over dipole.

PART – B

(Analytical/Problem solving questions) **[5×4=20]**

Attempt any five questions

Q.1 At 60 MHz the following characteristic of a lossy line are measured:

$Z_0 = 50\Omega$, $\alpha = 0.04$ dB/M, $\beta = 2.5$ rad/m

Calculate R, L, C and G of the line.

Q.2 Determine the polarization of a plane wave with:

$$E(z,t) = 4\exp(-0.25z)\cos(\omega t - 0.8z)\,\hat{a}_x + 3\exp(-0.25z)\sin(\omega t - 0.8z)\hat{a}_y \frac{V}{m}$$

Q.3 A 75Ω lossless line is to be matched to a load of 100 – j80Ω with shorted stub. Calculate the stub length.

Q.4 The magnetic field in a rectangular waveguide is given by:

$$H_x = 2\sin\left(\frac{\pi x}{a}\right)\cos\left(\frac{3\pi y}{b}\right)\sin(\pi \times 10^{11}t - \beta z)\frac{A}{m}$$

Q.5 Identify which function does not satisfy the wave equation in following:

(i) $50\exp(j\omega(t-3z))$

(ii) $\cos(5y + 2x)$

(iii) $\sin\omega(10z + 5t)$

Q.6 Define following parameter of antenna:

(i) Radiation resistance

(ii) Antenna cross section

(iii) Radiation efficiency

Q.7 State the following condition of EM wave:

(i) Total internal reflection

(ii) Reflection

(iii) Attenuation

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[3×10=30]**

Attempt any three questions

Q.1 (a) Derive all boundary condition of electric field when it crosses the boundary of:

(i) Two dielectric medium and

(ii) Dielectric to conductor

(b) The plane z = 0 separate region 1 (z > 0), which is a dielectric material with E_r = 4 from region 2 (z < 0), which is also a dielectric material of E_r = 6:5. If $D_1 = 16a_x + 30a_y - 20a_z$ nc/m^2, then find D_2.

Q.2 Find the expression of Poynting vector of EM wave.

Q.3 How antenna radiate a EM wave? Find the expression of far field from an antenna element. Also define the near field of an antenna.

Q.4 What is characteristic impedance? Find the expression of it in following cases:

(i) A transmission line terminated with load Z_L

(ii) Open circuit transmission line

(iii) Short circuit transmission line

Q.5 Modify following Maxwell equation for a dynamic field:

(i) $\nabla \times \varepsilon = 0$

(ii) $\nabla.D = \rho_v$

(iii) $\nabla.B = 0$

(iv) $\nabla \times M = J$

Also find the integral form of above laws.

5E1392

Roll No. _____ Total No. of Pages: 4

5E1392

B. Tech. V - Sem. (Back) Exam., February - 2023

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 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

[10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1 Justify that a magnetic field is a solenoid in nature.

Q.2 What is divergence theorem?

Q.3 Define the reflection coefficient and VSWR.

Q.4 What is the order of Laplace and Poisson equations?

Q.5 What is the difference between electric dipole and magnetic dipole?

Q.6 What is divergence theorem?

Q.7 What is pointing vector?

Q.8 What is meant by scalar and vector fields?

Q.9 Define displacement current density.

Q.10 What is stub?

PART – B

[5×8=40]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 What is Smith Chart? How it can be used to determine load impedance and input impedance of a terminated line?

Q.2 Ampere's magnetic circuit law cannot be used to find the field intensity of line current of finite length. Explain, why?

Q.3 Obtained the far and near fields due to half-wave dipole and quarter-wave monopole.

Q.4 How Quarter-Wave Transmission (QWT) line acts as an impedance transformer?

Q.5 If an electric field $E = 2i + 24j$ is incident at $x = 0$ from one medium $\varepsilon_{r1} = 4$ to second medium $\varepsilon_{r2} = 9$, then find the electric field in the second medium.

Q.6 What is boundary condition? Develop relation between normal and tangential electric field at the interface of two media.

Q.7 Draw the electric and magnetic field lines in TEM; assume the EM wave is propagating in the direction of x-axis.

Q.8 Write the differential and integral form of all four Maxwell's equations in lossy medium?

PART – C

[4×15=60]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any four questions

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

Q.2 Find the input impedance, reflection coefficient and VSWR on transmission line terminated by open circuit, short circuit and matched with load.

Q.3 A good conductor is located in a static electric field. Why?

(i) No field exists inside a conductor.

(ii) Charges are only on its surface.

(iii) Potential on its surface is same everywhere.

Q.4 Find all electric and magnetic fields expression for TE mode inside a rectangular waveguide with the help of Maxwell's equations.

Q.5 Find the total electric field at a point (0, 0, 2) due to two charges of equal in magnitude 10 C and opposite in nature which are placed at the point (0, - 2, 2) and (4, 0, 2) respectively.

Q.6 Define the following –

(i) Wave impedance

(ii) Energy density

(iii) Ampere's law

(iv) Conservative field

Q.7 Define the following terms of waveguide propagation -

(i) Cut–off frequency

(ii) Dominant Mode

(iii) Degenerate Mode

5E5022

Roll No. _____ Total No. of Pages: 2

5E5022

B. Tech. V - Sem. (Back) Exam., February - 2023
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 Draw the circuit diagram of the differential amplifier and perform it a.c. analysis to find out A_d, A_c, R_i, and R_o for dual input balanced output configuration. [16]

OR

Q.1 Draw the three input scalar circuit using op amp and derive the expression for output voltage in terms of input voltage signal. How this circuit can be used as adder. [16]

UNIT- II

Q.2 (a) Design a differentiator using op-amp to differentiate an input signal with f_{max} = 200 Hz. [8]

(b) Also draw the output waveforms for a sine-wave and a square-wave input of 1V peak at 200Hz. [8]

OR

Q.2 Explain the operation of a RC phase-shift oscillator with neat circuit diagram. Derive the expression for the frequency of oscillation and condition for sustain oscillations. [16]

UNIT- III

Q.3 Design a second order low-pass Butterworth filter with a cut-off frequency of 12 KHz and unity gain at low frequency. Also determine the voltage transfer function magnitude in dB at 15Hz for the filter. [16]

OR

Q.3 What are switched capacitor networks? Briefly explain the principal of the switched capacitor filters. Why do you need switched capacitor filters when you have conventional filters? [16]

UNIT- IV

Q.4 Draw the circuit diagram of as table multivibrator using IC 555. Derive the expression for frequency of output wave form for a as table multi vibrator and its duty cycle. Is duty cycle of output wave form can be 50%? If possible, then explain how? [16]

OR

Q.4 (a) With the neat block diagram, explain successive approximation type A/D (Analog to Digital) converter. [8]

(b) An 8-bit A/D converter accepts an input voltage signal of range 0 to 12V.

(i) What is the minimum value of the input voltage required to generate a change of 1 LSB? [2]

(ii) What input voltage will generate all 1s at the A/D converter output? [2]

(iii) What is the digital output for an input voltage of eV? [4]

UNIT- V

Q.5 With the circuit diagram, explain how multipliers can be design using log and antilog amplifiers. [16]

OR

Q.5 (a) Define capture-range, lock-range and pull in time of PLL. [8]

(b) Explain an analog phase detector with a suitable circuit diagram. Also draw the input and output waveforms. [8]

5E1782

Roll No. _____ Total No. of Pages: 2

5E1782

B. Tech. V - Sem. (Main) Exam., February - 2023
Electronics & Communication Engineering
5EC4 - 03 Control System

Time: 3 Hours **Maximum Marks: 70**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three 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 What do you mean by sensitivity of control system?

Q.2 Define step signal.

Q.3 Write Mason's gain formula.

Q.4 What are the advantages of Bode plot?

Q.5 Explain minimum phase system.

Q.6 What do you mean by dominant pole?

Q.7 What is time response?

Q.8 Define open loop and closed loop systems.

Q.9 What is root locus?

Q.10 What do you mean by state variables?

PART – B

(Analytical/Problem solving questions) **[5×4=20]**

Attempt any five questions

Q.1 Derive the expression for rise time, peak time and peak overshoot.

Q.2 Derive the expression and draw the response of first order system for unit step input.

Q.3 A unit feedback control system has an open loop transfer function –

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

Find the rise time and setting time.

Q.4 What are the effects of PD controller on the system?

Q.5 Explain the effects of positive feedback on the stability of system.

Q.6 What are the essential characteristics of signal flow graph?

Q.7 Differentiate between linear system and non linear system.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[3×10=30]**

Attempt any three questions

Q.1 Explain Routh Hurwitz criterion for stability.

Q.2 Explain servomotors and its types.

Q.3 Derive the frequency domain specifications of second order system.

Q.4 Derive the time response of underdamped and critically damped second order system for unit step input.

Q.5 Compare lag, lead and lead-leg compensating network in detail.

5E1393

Roll No. _____ Total No. of Pages: 3

5E1393

B. Tech. V - Sem. (Back) Exam., February - 2023

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 What is LVDT?

Q.2 Write difference between transient and steady state response.

Q.3 Explain rise time and settling time.

Q.4 What is tacho – generators?

Q.5 Explain PID Controller.

Q.6 What is lag and lead compensation?

Q.7 What do you mean by feed forward control?

Q.8 Explain relative stability.

Q.9 Define phase margin and gain margin.

Q.10 Explain the multi variable control system.

PART – B

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

Attempt any five questions

Q.1 What is closed loop transfer function of a system with positive feedback? Explain, what is the effect on stability?

Q.2 Simplify the block diagram shown in figure 1.

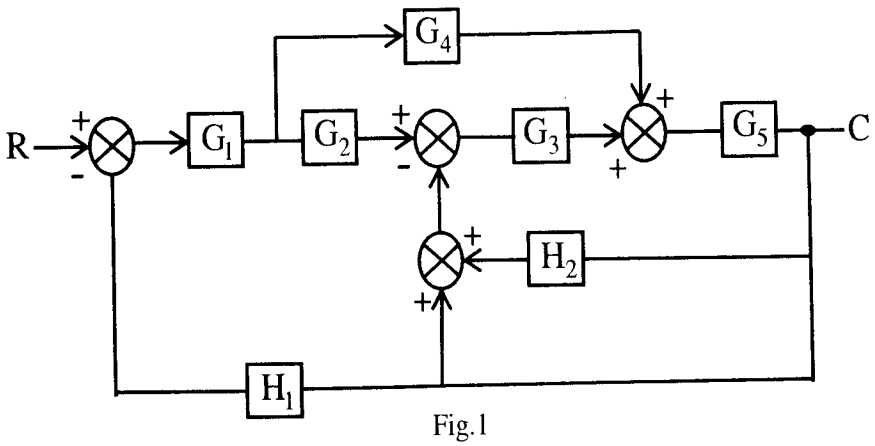

Fig.1

Q.3 A unity feedback control system has $G(s) = \frac{1}{s(s+2)}$. The input of the system is given by $r(t) = 2t + 3t + 3t^3$. Determine the general error coefficient and steady state error.

Q.4 The open loop transfer function of a unity feedback control system is $G(s) = \frac{(s+0.25)}{s^2(s+1)(s+0.5)}$. Determine closed loop stability and Nyquist criteria.

Q.5 The feedback control system transfer function is $G(s)H(s) = \frac{K}{s(s^2+2s+5)}$. Determine the Gain K such that Gain Margin is 6 db. Also, determine the value of phase margin for the value of K obtained as above.

Q.6 Sketch the Root – Locus plot for the open loop transfer function is $G(s)H(s) = \frac{K(s^2+4)}{s(s+2)}$. Calculate the value of K at –

(a) Breakaway point

(b) $S = 0.69 + j\,0.9$

Q.7 Obtain state model for the transfer function $\frac{Y(s)}{U(s)} = \frac{6(s+3)(s+2.5)}{(s+2)(s^2+4s+5)}$.

PART – C

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

Attempt any four questions

Q.1 The open loop transfer function of a unity feedback control system is $G(s) = \frac{K}{s(ST+1)}$. By what factor, the gain K should be multiplied so that the damping ratio is increased from 0.3 to 0.69.

Q.2 What is the concept of controllability and observability? Explain both with suitable example and mathematical expressions.

Q.3 The transfer function of a unity feedback control system is $G(s)H(s) = \frac{720\,(s+1.25)}{s(s+10)(s^2+2s+9)}$. Determine the closed loop stability using Bode Plot method.

Q.4 Write a short note on –

(a) Diagonalization of transfer function

(b) Solution of state equations

Q.5 Write a short note on –

(a) Optimal control

(b) Non-linear control

5E5023

Roll No. _____ Total No. of Pages: 2

5E5023

B. Tech. V - Sem. (Back) Exam., February - 2023
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 Derive the condition for distortionless transmission. What is wave velocity and characteristics impedance of distortionless line? [16]

OR

Q.1 Show that the input impedance of a transmission line of length l terminated by an impedance ZR is given by - [16]

$$Z \text{ input} = Z_0 \left(\frac{Z_R \cosh l + Z_0 \sinh l}{Z_0 \cosh l + Z_R \sinh l} \right)$$

Where, Z_0 is secondary constant of line.

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UNIT- II

Q.2 Describe Smith Chart and its use in single stub matching. [16]

OR

Q.2 Explain stub matching and double stub matching. [16]

UNIT- III

Q.3 Discuss the advantages and disadvantages of constant K filters. Calculate the cut-off frequency of m-derived high pass filter. [16]

OR

Q.3 Explain the significance of equalizer? What are inverse impedances? Discuss the simple amplitude equalizer using inverse impedance. [16]

UNIT- IV

Q.4 What is echo in a telephonic system? How echo suppressor and echo canceller help in reducing the echo? [16]

OR

Q.4 What is cross talk? What all its main causes? Suggest suitable measures for reducing the cross talk. [16]

UNIT- V

Q.5 What is basic principle of electronic switching in telephone exchange? Describe block-diagram and working of Stored Program Control (SPC) exchange. [16]

OR

Q.5 What is meant by 'Grade of Service'? What is its significance in planning the equipment of our telephone exchange? [16]

5E5024

Total No. of Questions: Total No. of Pages: 2

Roll No. _____

B.Tech. V-Sem (Back) Exam. Feb. 2023

Electronics & Communication Engg.

5EC4A Analog Communication

5E5024

Time: 3 hours **Maximum Marks: 80**

Min Passing Marks: 26

Attempt any **fivequestions,** 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_____ 2. _____

UNIT-1

Q.1 (a) Calculate the overall noise figure and equivalent noise temperature of the cascaded amplifiers. (10)

(b) What is the need for modulation? Draw the block diagram of the communication system and explain its working. (6)

OR

Q.1 (a) Define noise and give its classification. What are theShot and Thermal noise? (10)

(b) Explain the terms: Noise figure and Noise temperature. (6)

UNIT-2

Q.2 (a) Draw the circuit diagram of the envelope detector and explain its working. (8)

(b) Explain Weaver's method of SSB-SC signal generation. (8)

OR

Q.2(a)Draw the block diagram of the Superheterodyne receiver and explain its working. (10)

(b) Explain the methods of generation of Amplitude Modulation. (6)

UNIT-3

Q.3(a) Draw and explain the circuit diagram of the following FM modulators (i) Using varactordiode (ii) Reactance tube modulator. (10)

(b) Define the FM and PM and write the equations for these signals. (6)

OR

Q.3(a)Draw the schematic diagram of an FM Transmitter and Receiver (6)

(b) Draw and explain the circuit diagram of the following FM detectors (i) PLL detector (ii) Foster-Selay discriminators (10)

UNIT-4

Q.4Derive the expression for the noise power density at the discriminator output and draw its spectrum. Derive a relation for a figure of merit for FM and compare it with a figure of merit of AM system. (16)

OR

Q.4(a)Calculate the figure of merit for DSB and SSB Systems with an envelope detector and discuss the threshold effect. (12)

(b) Define the terms Pre-emphasis and De-emphasis with suitable circuits. (4)

UNIT-5

Q.5(a) Draw the waveforms PWM and PPM and explain the method of generation of PWM and PPM using PLL. (12)

(b) What is sampling? Discuss the flat-top sampling. (4)

OR

Q.5 (a) Discuss the applications and methods of generation of PAM. (8)

(b) Briefly explain the TDM-PAM system. (8)

5E1783

Roll No. _____ Total No. of Pages: 3

5E1783

B. Tech. V - Sem. (Main) Exam., February - 2023

Electronics & Communication Engg.

5EC4-04 Digital Signal Processing

Time: 3 Hours **Maximum Marks: 70**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three 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 What is Nyquist Criteria?

Q.2 Define Z-Transform..

Q.3 What do you mean by an inverse system?

Q.4 What is Twiddle factor in DFT?

Q.5 What is the Principle of D-I-T FFT?

Q.6 What is the FIR Filter?

Q.7 Mention any single advantage of IIR Filter over FIR Filter.

Q.8 What is an Elliptic Approximation in the Digital Filters?

Q.9 What is the effect of Finite Register Length in FIR Filter Design?

Q.10 Write any one application of DSP.

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PART – B

(Analytical/Problem solving questions) **[5×4=20]**

Attempt any five questions

Q.1 Explain, whether or not, for a finite sampling rate, f, we can perfectly reconstruct (t) from its samples, $f[n]$.

Q.2 Given the sequence, $x(n) = a^n u(n)$, find the z-transform of x(n).

Q.3 Analyse the LSI system with suitable mathematical expressions.

Q.4 Discuss the various (any five) properties of DFT with suitable mathematical expressions.

Q.5 Write the steps to design FIR filters using window method.

Q.6 Compare the parametric and Non-parametric spectral estimation.

Q.7 Draw the basic characteristics of Butterworth and Chebyshev Band-pass and Band-stop Filters.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[3×10=30]**

Attempt any three questions

Q.1 Consider the Analog signal $x(t) = 3 \cos 100\pi t$,

(a) Determine the minimum sampling rate required to avoid aliasing.

(b) Suppose the signal is sampled at the rate $f_s = 200Hz$, then what is the discrete time signal obtained after sampling?

Q.2 Compute the convolution of the signal,

$X_1[n] = [1, -2, 1]$ and $x_2[n] = x[n] = \begin{cases} 1, & 0 \le n \le 5 \\ 0 & elsewhere \end{cases}$

Using Z-transform.

Q.3 Compute the DFT of 4-point sequence, x[n]= [0, 1, 2, 3] and also compute the IDFT to get the original sequence.

Q.4 Describe the method of designing an IIR digital filter from corresponding analog filter.

Q.5 Explain multi-rate digital signal processing with suitable diagrams and mathematical expressions.

5E1394

Roll No. _____ Total No. of Pages: 3

5E1394

B. Tech. V - Sem. (Back) Exam., February - 2023

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

[10×2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1 What do you understand by inverse systems? Show it by mathematical expression.

Q.2 Write the mathematical expressions of the Z-transform and inverse Z-transform for the given signal x(n).

Q.3 State the time reversal property of the Z-transform.

Q.4 Discuss about the Time invariance property of a system.

Q.5 What do you understand by bilinear transformation?

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Q.6 What do you mean by digital filter coefficients? Discuss its rounding-off effect.

Q.7 Discuss the periodicity property of the DFT.

Q.8 What do you understand by finite word length effect?

Q.9 What is the need of FFT?

Q.10 What are the advantages of linear phase FIR filter?

PART – B

[5×8=40]

(Analytical/Problem solving questions)

Attempt any five questions

Q.1 Determine the output response of an LTI system expressed by $y(n) - 0.5\, y(n-1) = x(n)$, for input signal $x(n) = (0.5)^n u(n)$.

Q.2 Compute the circular convolution of the two sequences $x_1(n) = \{1, 1, 2, 2\}$ and $x_2(n) = (4, 5, 2, 1)$ using DFT IDFT method.

Q.3 Derive an expression to calculate the following property of N-point DFT. If DFT $\{x(n)\} = X(k)$, then DFT $\{X(N-n)\} = ???$

Q.4 Find the inverse DFT of $Y(k) = (1, 0, 1, 0)$.

Q.5 Write about frequency transformation of a Low Pass Filter (LPF) into HPF, BPF and BSF filters.

Q.6 Discuss about the stability of discrete time systems by plotting ROC in the Z-domain. Show this by writing a suitable transfer function in the Z-domain.

Q.7 Determine the impulse response h(n) for the system described by the second-order difference equation $y(n) + 4y(n-1) + 3y(n-2) = x(n-1)$

PART – C

[4×15=60]

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any four questions

Q.1 Compute the 8-point DFT of the discrete time signal $x(n) = \{1,2,1,2,1,3,1,3\}$ by using Radix-2 Decimation in time FFT algorithm.

Q.2 Design a linear phase FIR low pass filter using hamming window by taking 5 samples of window sequence and with a cutoff frequency, $\omega_c = 0.35\pi$ rad/sample.

Q.3 Draw the direct form II structure for the following transfer function -

$$y(n) = -\frac{3}{8}y(n-1) + \frac{3}{32}y(n-2) + \frac{1}{64}y(n-3) + x(n) + 3x(n-1) + 2x(n-2)$$

Q.4 Design a Butterworth digital IIR low pass filter to satisfy the following specifications –

$$|H(z)| \leq 0.15 \quad ; \quad \text{for } 0.8\pi \leq \omega \leq \pi$$
$$0.45 \leq |H(z)| \leq 1 \quad ; \quad \text{for } 0 \leq \omega \leq 0.675\pi$$

Q.5 Discuss the multi-rate digital signal processing by taking a suitable example of it.

5E1784

Roll No. _____ Total No. of Pages: 2

5E1784

B. Tech. V - Sem. (Main) Exam., February - 2023
Electronics & Communication Engineering
5EC4 – 05 Microwave Theory & Techniques

Time: 3 Hours **Maximum Marks: 70**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three 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 S-matrix.

Q.2 Write down the properties of impedance (X) and admittance (Y) matrix.

Q.3 Explain and differences between isolator and circulator.

Q.4 Describe the applications of directional coupler.

Q.5 Define VSWR.

Q.6 What is Hybrid Ring?

Q.7 Write down the applications of Reflex Klystron.

Q.8 What do you mean by O-type tubes? Name some O-type tubes.

Q.9 Write down the applications of Gunn diode.

Q.10 What are tunable detector?

PART – B

(Analytical/Problem solving questions) **[5×4=20]**

Attempt any five questions

Q.1 A transmission line has the following parameters:

R = 2Ω/m; G = 0.5 mho/m; F = 1 GHz; L = 8nH/m; C = 0.23pF

Calculate:

(a) Characteristic impedance; (b) the propagation constant

Q.2 Describe the principle of operation of a Travelling Wave Tube (TWT).

Q.3 A certain transmission line has a characteristics impedance of 75 + j0.01Ω and is terminated in a load impedance of 75 + j50Ω Compute:

(a) the reflection coefficient; (b) the transmission coefficient

Q.4 Discuss Magnetron oscillators.

Q.5 Discuss the various types of losses in microstrip line.

Q.6 Write down the MMIC fabrication techniques.

Q.7 Explain in detail about microwave detectors.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[3×10=30]**

Attempt any three questions

Q.1 Derive the field equation for rectangular waveguide in TE_{10} mode.

Q.2 Derive the power transmission in circular waveguide.

Q.3 Explain in detail the Gunn Effect.

Q.4 A Travelling Wave Tube (TWT) operates under the following parameters:

Beam voltage : $V_0 = 3kV$

Beam current : $I_0 = 30mA$

Characteristics impedance of helix : $Z_0 = 10\Omega$

Circuit length : N = 50

Frequency : F = 10GHz

Determine :

(a) the gain parameter C;

(b) the output power gain A_p in dB ;

(c) all four propagation constants

Q.5 Compute phase and gain of Radiation pattern for antenna measurement.

5E1395

Roll No. _____ Total No. of Pages: 3

5E1395

B. Tech. V - Sem. (Back) Exam., February - 2023
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 How does microwave technology differ from low-frequency radio technology?

Q.2 Give four major applications of microwaves.

Q.3 Show that TEM mode cannot exist in a hollow waveguide.

Q.4 A $\lambda/8$ section of a lossless transmission line is terminated in a loud $(25 + j50)\ \Omega$. If characteristic impedance of the line is 100Ω. Determine the input impedance of the line.

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Q.5 Find the cut-off frequencies of the front three modes of a surface waveguide of dielectric $\varepsilon_r = 2.55$ and thickness 1mm.

Q.6 Define impedance/admittance of a microwave network.

Q.7 What is the effect of the bends and discontinuities on the field pattern?

Q.8 How the P/N diode can be used as a SPDS?

Q.9 What are slot lines and how do they differ from micro strip lines?

Q.10 How will you detect microwave signal?

PART – B

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

Attempt any five questions

Q.1 A lossless line of length 25m is terminated in a loud $Z_L = 40 + j30\ \Omega$. It is operating at a frequency of 10 MHz. It has capacitance of 40 PF/m and inductance 300 nH/M. Determine the input impedance at source and reflection coefficient of the line.

Q.2 Discuss "waveguide propagation as a reflection phenomena" and hence obtain expression for cut-off wavelength, group and phase velocities.

Q.3 Write all the properties of a S-matrix. Explain the reason for $S_{ij} = S_{ji}$ for a microwave system.

Q.4 Explain and design a power divider which divide power unequally.

Q.5 What are E and H-plane tees? How they are used?

Q.6 Explain the terms velocity modulation and density modulation.

Q.7 A branch line 3 dB coupler is designed using input-output line characteristic impedance 50Ω each. Determine line impedance Z_{01} and Z_{02}.

PART – C

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

Attempt any four questions

Q.1 The double minima method is used to determine the VSWR value on a waveguide. If the separation between two adjacent nulls is 3.5 cm and the between twice minimum power point is 2.5 mm, determine the value of VSWR.

Q.2 What is an MMIC? How does it differ from a MIC circuit? Outline the advantages of MMIC over MIC circuits.

Q.3 In broadside coupled strip line of a 3-d8 directional coupler has even mode characteristic impedance of 50Ω. Determine its odd mode impedance.

Q.4 Examine the stability of a microwave transistor amplifier having scattering parameters as $S_{11} = 0.34 \angle -170°$, $S_{12} = 0.06 \angle 70°$, $S_{21} = 4.3 \angle 80°$, $S_{22} = 0.62 \angle -40°$.

Q.5 The scattering matrix of a two-port microwave network is given below –

$$[S] = \begin{bmatrix} 0.15 \angle 0° & 0.85 \angle -45° \\ 0.85 \angle 45° & 0.20 \angle 0° \end{bmatrix}$$

Find out -

(a) If the network is reciprocal

(b) If the network is lossless

(c) The return loss when port 2 is terminated in a matched load

(d) The return loss when the second port is terminated in a short circuit

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5E5025

Roll No. _____ Total No. of Pages: 3

5E5025

B. Tech. V - Sem. (Back) Exam., February - 2023
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) Discuss & give the relations of following parameters of microchip lines – [8]

(i) Losses

(ii) Characteristic impedance.

(b) Explain parallel coupled strip lines with all design parameters. [8]

OR

Q.1 (a) Derive an expression for the field in rectangular waveguide in case of Transverse Magnetic (TM) wave. [8]

(b) How a slot line differs from a microstrip line? [4]

(c) Draw the structure with field lines of parallel coupled strip lines and explain even mode exitation. [4]

UNIT- II

Q.2 (a) Discuss the following – [8]

(i) Reciprocal Networks

(ii) Lossless network

(b) A series reactance Z = jx is connected between two lines with different characteristic impedance Z_1 and Z_2. Find the S matrix of the junction. [8]

OR

Q.2 (a) Discuss the following properties of S-matrix - [8]

(i) Zero property

(ii) Unity property

(iii) Symmetric property

(iv) Phase shift property

(b) Explain scattering matrix for two port network. [8]

UNIT- III

Q.3 (a) Discuss the magic tee. Derive the scattering matrix for magic tee. [10]

(b) Design a 3dB branch line coupler. Draw its layout using microstrip line. [6]

OR

Q.3 (a) Explain the working of directional coupler & following parameters regarding directional coupler - [8]

(i) Coupling factor

(ii) Insertion loss

(b) Draw the Wilkinson power divider and its layout using microstrip line. [8]

UNIT- IV

Q.4 (a) Describe a procedure for VSWR measurement using microwave bench setup. [8]

(b) Discuss how measurement are made using a noise figure meter. [8]

OR

Q.4 (a) What are the types of network analyzers? Explain any one of them with the help of suitable block diagram. [8]

(b) Describe the microwave power measurement. [8]

UNIT- V

Q.5 (a) Discuss hybrid technology (Photolithographic process and discrete lumped components) with examples. [8]

(b) Describe the MMIC techniques and also list the basic materials of MMIC. [8]

OR

Q.5 (a) Discuss the advantages and disadvantages of MMIC. [8]

(b) Describe the Microwave Monolithic Integrated Circuit (MMIC) Technology and their application. [8]

5E1785

Roll No. _____ Total No. of Pages: 2

5E1785

B. Tech. V - Sem. (Main) Exam., February - 2023

Electronics & Communication Engg.

5EC5-11 Bio-Medical Electronics (Elective-I)

Time: 3 Hours **Maximum Marks: 70**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three 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 What are the body surface electrodes?

Q.2 Differentiate between Lead and Electrodes.

Q.3 Write medical use of isotopes.

Q.4 Define action and resting potentials.

Q.5 Define Blood Pressure.

Q.6 Describe atrial abnormalities.

Q.7 Define Artifacts in biomedical system.

Q.8 Define Cardiac Rate.

Q.9 Draw the basic diagram of pacemakers.

Q.10 Write the applications of plethysmography.

PART – B

(Analytical/Problem solving questions) **[5×4=20]**

Attempt any five questions

Q.1 Describe in detail with the principle involved of electrodes used for measurement of EMG and EEG.

Q.2 Explain working principle of Electromagnetic blood flow meter with suitable diagram.

Q.3 Describe Selection criteria of transducers and electrodes in medical applications with example.

Q.4 Discuss in brief the real time computer applications in Bio-Medical Electronics.

Q.5 What is the need of pacemakers? Explain any one synchronous pacemaker in detail.

Q.6 Explain the functioning of Heart-Lung Machine.

Q.7 Explain Nuclear imaging techniques in biomedical field.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[3×10=30]**

Attempt any three questions

Q.1 What is Electrocardiogram? Explain the functioning of ECG Machine with the help of a neat block diagram. Explain how it acquired all 12 lead configurations.

Q.2 Give the brief anatomy of physiology of following human body subsystems. Also, discuss the engineering analogous and variable of prime importance for Respiratory and Neural System.

Q.3 What are Defibrillators? How are they classified? Explain the construction and working of defibrillators with suitable diagram, applications and precautions.

Q.4 What do you mean by electrical activity of excitable cells. Explain construction and working of dissolved ions and gases measurement transducers with merits and demerits.

Q.5 What are physiological effects of electric current shock hazards from Electrical Equipment's? Explain its safety measures.

5E1787

Roll No. _____ Total No. of Pages: 2

5E1787

B. Tech. V - Sem. (Main) Exam., February - 2023
Electronics & Communication Engineering
5EC5 – 14 Satellite Communication (Elective-I)

Time: 3 Hours **Maximum Marks: 70**

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three 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 What do you understand by up-link frequency and down-link frequency in satellite communication?

Q.2 Explain the concept of solar eclipse and lunar eclipse on satellite.

Q.3 Explain the term Doppler shift.

Q.4 What is satellite transponder involved in satellite communication.

Q.5 Explain the meaning of centripetal and centrifugal force acting on satellite.

Q.6 How concept of solar day is different from sidereal day, explain both.

Q.7 Compare LEO, GEO and MEO satellite.

Q.8 What is the difference between geosynchronous and a geostationary satellite?

Q.9 What are the terms apogee and perigee used in satellite communication.

Q.10 Give the applications of satellites.

PART – B

(Analytical/Problem solving questions) **[5×4=20]**

Attempt any five questions

Q.1 Briefly illustrate the working principle of satellite communication with suitable block diagram.

Q.2 Calculate the radius of a circular orbit for which the periods is 1 day.

Q.3 Derive the expression of uplink CNR.

Q.4 The semi-major axis and the semi-minor axis of an elliptical satellite orbit are 20,000km and 16,000km respectively. Determine the apogee and perigee distances.

Q.5 The cosmos 1675 satellite has an apogee height of 39342km and a Perigee height of 613km. Determine the semi major axis and the eccentricity of its orbit. Assume a mean earth radius of 6371km.

Q.6 State three Kepler's Laws and discuss its importance in satellite communication.

Q.7 An antenna has a noise temperature of 35K and is matched into a receiver which has a noise temperature of 100K. Calculate the noise power density and the noise power for a bandwidth of 36 MHz.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) **[3×10=30]**

Attempt any three questions

Q.1 A satellite is in a 322-Km high circular orbit. Determine the following –

(a) The orbital angular velocity in radian per second

(b) The orbital period in minutes

(c) The orbital velocity in meter per second

Q.2 Explain the attitude and orbital control of a satellite with necessary diagrams.

Q.3 With a neat sketch, explain telemetry, tracking and command subsystem.

Q.4 Explain the different types of noises to be considered in the design of satellite communication system.

Q.5 Discuss the principles of CDMA. Explain the application of CDMA in satellite communication.

5E1396

Roll No. _____ Total No. of Pages: 2

5E1396

B. Tech. V - Sem. (Back) Exam., February - 2023
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 Define transducers.

Q.2 What are pacemakers?

Q.3 What are soft and hard X-rays?

Q.4 Write the principle behind the electromagnetic blood flow meter.

Q.5 What is macro shock?

PART – B

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

Attempt any four questions

Q.1 Draw and explain the different lead configuration and its significances in ECG.

Q.2 Discuss about the different types of electrodes used in bio-potential measurement.

Q.3 Discuss about the electrical safety in medical equipment.

Q.4 Explain the brief introduction to human physiology.

Q.5 Show the application of transducers for the measurement of dissolved ions and gases.

Q.6 With suitable illustration, explain the functional aspects of X-ray machine.

PART – C

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

Attempt any two questions

Q.1 Explain the principle of nuclear imaging with neat diagram.

Q.2 Classify the biomedical transducers and mention the factors considered while selecting a transducer.

Q.3 List the requirements of a bio-potential amplifier. Explain its application to measure EEG.

5E1398

Roll No. _____ Total No. of Pages: 2

5E1398

B. Tech. V - Sem. (Back) Exam., February - 2023
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 Explain the Sun transit outage phenomenon.

Q.2 Define concept of Solar day and Sidereal day.

Q.3 Give the name of sources of noise and losses in satellite communication.

Q.4 Explain the circumstances under GEO, LEO and MEO satellites are used.

Q.5 Define the power sub systems for satellite communication.

PART – B

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

Attempt any four questions

Q.1 Sate the Keplar's laws as applied to satellite communications. Briefly describe the orbital parameters with the help of a diagram.

Q.2 Describe the operation of a pre-assigned TDMA system. Illustrate a typical TDMA frame structure. Mention the advantages of TDMA over FDMA.

Q.3 Discuss the solar eclipse phenomenon in satellite communication its effects and remedies.

Q.4 Explain the function of Up converter and Down converter.

Q.5 Write the advantages of GEO stationary orbits.

Q.6 What are the satellite subsystems? Draw a diagram of AOCS and explain.

PART – C

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

Attempt any two questions

Q.1 Draw a neat diagram of telemetry, tracking, command and monitoring systems for successful operation of ccmmunication satellite and explain.

Q.2 Discuss the satellite link design procedure for uplink and downlink and find the expression for C/N with considerations of attenuation and rainy conditions.

Q.3 Consider a satellite transmitting 25W at a frequency of 4GHz via and antenna of 18dB. An earth station in the network uses an antenna of 12m diameter with an efficiency of 65%. Determine -

(i) the gain of the earth station antenna; (ii) the path loss; (iii) the flux density at the earth station, assuming the satellite-earth station range to be 40000km; (iv) the power received at the output of the earth station antenna.

5E5026

Roll No. _____ Total No. of Pages: 3

5E5026

B. Tech. V - Sem. (Back) Exam., February - 2023
Electronics & Communication Engineering
5EC6.1A Biomedical Instrumentation

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 Briefly describe the following human body subsystems along with their electrical and mechanical activities -

(a) Muscular [8]

(b) Respiratory [8]

OR

Q.1 (a) Describe the principles and classification of transducers for bio-medical applications. [8]

(b) Explain the electrode theory with the help of suitable diagram and also explain the selection criteria for electrodes. [8]

UNIT- II

Q.2 Describe the following electrical activities of excitable cells -

(a) ENG [4]

(b) EMG [4]

(c) ECG [4]

(d) ERG [4]

OR

Q.2 In cardiovascular system measurements, discuss the following measurements -

(a) Blood Pressure [8]

(b) Cardiac Rate [8]

UNIT- III

Q.3 Describe the procedure for the measurement of the following parameters in blood/ human body with a neat sketch -

(a) pH value [8]

(b) ESR measurement [8]

OR

Q.3 You are asked to quantity the CO_2 exhaled by a patient. The CO_2 absorbs 4.2 μm wavelength of light. Develop a detection and quantifying system for sensing CO_2 in the exhaled air using light. [16]

UNIT- IV

Q.4 (a) What is biotelemetry? How patient monitoring can be realized using biotelemetry? [8]

(b) Explain the causes of electric shock hazards in hospitals. What are the precautions to minimize electric shock hazards? [8]

450

OR

Q.4 (a) Explain Heart-Lung machine with the help of a neat diagram. [8]

(b) Explain the working of Defibrillators in hospitals with the help of suitable diagrams. [8]

UNIT- V

Q.5 (a) Discuss the electrocardiographic diagnostic criteria for identification of cardiac disorders. [8]

(b) Discuss the following -

(i) Atrial abnormalities [4]

(ii) Ventricular enlargement [4]

OR

Q.5 Write short notes on the following - (Any two) [2×8=16]

(a) Data acquisition and processing

(b) Remote data recording

(c) Real-time computer application
