Hall Ticket Number :										

R-19

Code: 19A443T

II B.Tech. II Semester Regular Examinations August 2021

Analog Communication Systems

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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			Marks	CO	Blooms Level
		UNIT–I			
1.	a)	Derive an expression for single-tone amplitude modulated wave. Also draw its spectrum.	6M	CO1	L2
	b)	A Radio transmitter using AM has unmodulated carrier output power of 10kw and can be modulated to a maximum depth of 90% by a sinusoidal modulating voltage without causing overloading. Find the value to which unmodulated carrier power may be increased without resulting in overloading if the maximum permitted modulation index is restricted to 40%?	8M	CO1	L2
		OR			
2.	a)	Explain the detection of DSB-SC signal.	7M	CO1	L2
	b)	Explain the detection method for SSB-SC.	7M	CO1	L2
		UNIT–II			
3.	a)	Explain with suitable diagram, how the Wide band FM signal may be generated.	6M	CO2	L3
	b)	An FM wave is given by $s(t) = 20\cos\{2\pi \times 10^{8} t + 7\sin 2\pi \times 125 t\}$. Determine (i) The carrier and modulating frequency (ii) The modulation index and maximum deviation. (iii) Power dissipated by this FM wave.	8M	CO2	L3
		OR			
4.	a)	Explain about Armstrong method of FM in detail.	9M	CO2	L3
	b)	Compare AM with FM signal.	5M	CO2	L3
		UNIT–III			
5.	a)	Write a short notes on threshold effect in FM	7M	CO3	L5
	b)	Discuss the role of pre-emphasis and de-emphasis. Derive the transfer functions of these two circuits.	7M	CO3	L5
		OR			
6.	a)	Explain the FOM of a DSBSC system.	7M	CO3	L5
	b)	Derive the expression for FOM of FM system	7M		L5
		UNIT–IV			
7.	a)	What is image frequency? Explain its effect on voice communication.	10M	CO4	L1
	b)	Explain about tuned radio frequency receiver.	4M	CO4	L1
		OR			
8.	a)	With suitable diagram explain an AM Transmitters.	7M	CO4	L1
	b)	Write about super heterodyne receiver.	7M	CO4	L1
		UNIT–V			
9.	a)	Explain the generation of PPM signal.	7M	CO5	L4
	b)	Briefly explain the generation of double polarity PAM and its generation.	7M	CO5	L4
		OR			
10.	a)	With neat sketched, explain briefly the basic principle of FDM.	7M	CO5	L4
	b)	Find out and represent the spectrum of natural sampling and flat top sampling and compare them.	7M	CO5	L4

END

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Code: 19A441T

II B.Tech. II Semester Regular Examinations August 2021

Analog IC Applications

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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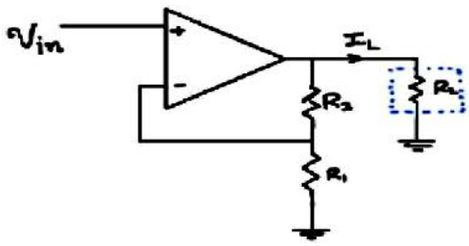
			Marks	CO	Blooms Level
		UNIT–I			
1.	a)	For the non-inverting configuration shown below, for different load R_L = 1kΩ, 10kΩ and 100kΩ find the load current I_L. Assume ideal op amp with V_{in} =1mV, R_1=1kΩ and R_2=1KΩ 	7M	CO1	L3
	b)	Discuss in detail about AC characteristics of an op-amp.	7M	CO1	L2
		OR			
2.	a)	Draw the pin diagram of IC 741 op-amp and explain its features	6M	CO1	L2
	b)	Explain the working of Inverting op-amp and derive the equation of its gain	8M	CO1	L2
		UNIT–II			
3.	a)	Design a Differentiator that will differentiate an input signal.	7M	CO2	L6
	b)	Draw the Op-amp based Subtractor circuit and show that the output is proportional to the difference of the two input voltages	7M	CO2	L3
		OR			
4.	a)	Draw and explain the circuit of a voltage to current converter, if the load is (i) floating (ii) Grounded	7M	CO2	L2
	b)	Explain about Non-Inverting Summing amplifier and derive the equation for output voltage?	7M	CO2	L3
		UNIT–III			
5.	a)	How is op-amp used as comparator? explain its working	7M	CO2	L2
	b)	Explain about active filters.	7M	CO3	L6
		OR			
6.	a)	Draw the circuit diagram of triangular wave generator and explain its operation and derive expression for frequency of oscillations	8M	CO2	L3
	b)	Explain the operation of Precision rectifier with neat circuit diagram	6M	CO2	L2
		UNIT–IV			
7.	a)	Draw and explain the operation of Astable multivibrator by using IC 555 timer and derive the expression for frequency of oscillations.	8M	CO4	L3
	b)	Explain the working of Schmitt trigger using IC 555 timer	6M	CO4	L2
		OR			
8.	a)	Derive the expression of time delay of a Monostable multivibrator using 555 timer.	7M	CO4	L3
	b)	Draw the functional diagram of IC 565 PLL and explain its operation	7M	CO4	L2
		UNIT–V			
9.	a)	Explain the working of Inverted R-2R ladder type DAC with neat diagram	7M	CO5	L2
	b)	Explain the working of Weighted resistor type DAC with neat diagram	7M	CO5	L2
		OR			
10.	a)	Explain the operation of counter type ADC with neat circuit diagram	7M	CO5	L2
	b)	Explain the operation of Successive approximation register ADC with neat circuit diagram	7M	CO5	L2

END

Hall Ticket Number :										

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Code: 19A442T

II B.Tech. II Semester Regular Examinations August 2021

Control Systems

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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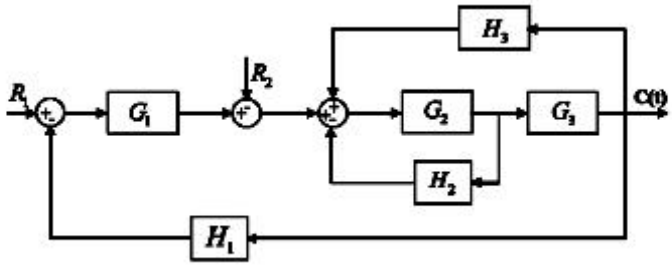
			Marks	CO	Blooms Level

UNIT–I

1. a) Compare the Open loop and Closed loop control systems. 7M

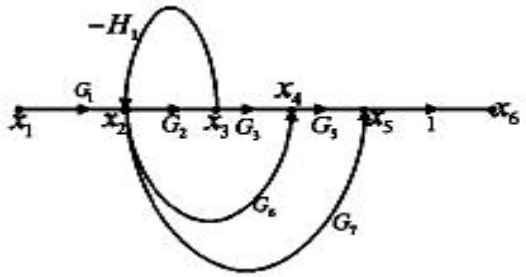
   b) Obtain *C/R*1 and *C/R*2 for the system shown below



7M

OR

2. a) Find the transfer function for the signal flow graph shown below, using Mason's gain formula:



7M

   b) Derive the transfer function of field controlled dc motor. 7M

UNIT–II

3. a) Sketch the root locus w.r.t of the characteristic equation for the closed loop system

$$1+G(s)H(s)=1+\frac{k}{s(s+2)(S^2+2s+2)}$$ 7M

   b) Establish the stability of the system having characteristic equation, $s^4+8s^3+18s^2+16s+5=0$, using Routh stability criterion. 7M

OR

4. a) Derive the static error constants and list the disadvantages? 7M

   b) Find step, ramp and parabolic error coefficients and their corresponding steady-state error for unity feed-back system having the T.F $G(s)=\frac{14(s+3)}{s(s+5)(s^2+3s+2)}$ 7M

UNIT–III

5. a) Explain the procedure of Nyquist criterion. 7M

   b) Given $G(s)=\frac{k}{s(s+2)(s+10)}$, Sketch Nyquist plot & find range of K for stability. 7M

OR

6. a) Sketch the Bode plot for the system with the transfer function

   $$G(s)H(s)=\frac{10}{s(1+0.5s)(1+0.1s)}$$ 9M

   b) Determine gain cross over frequency and gain margin from the above plots. 5M

UNIT–IV

7. a) What is compensation? What are the different types of compensators? 4M

   b) What is a lead compensator, obtain the transfer function of lead compensator and draw pole-zero plot? 5M

   c) Explain the different steps to be followed for the design of compensator using Bode plot? 5M

OR

8. The open loop transfer function of certain unity feedback control system is given by $G(s)=\frac{k}{s(s+4)(s+80)}$ It is desired to have the phase margin to be at least 33^0 and velocity error constant KV = 30 Sec−1 . Design a phase lag series Compensator? 14M

UNIT–V

9. a) What are the properties of state transition matrix? 6M

   b) Consider the vector matrix differential equation describe the dynamics of the system as $X=\begin{bmatrix}0 & 1\\ -6 & -5\end{bmatrix}$ Determine state transition matrix? 8M

OR

10. a) Discuss the significance of state Space Analysis? 7M

    b) Define the terms Controllability and observability and write necessary conditions for verification of controllability and observability? 7M

END

Hall Ticket Number :										

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Code: 19A444T

II B.Tech. II Semester Regular Examinations August 2021

Field Theory and Transmission Lines

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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			Marks	CO	Blooms Level
		UNIT–I			
1.	a)	Determine the cylindrical and spherical coordinates of the following vectors: i. $D = (x+z)\, a_y$ ii. $E = (y^2 - x^2)\, a_X + xyz\, a_y + (x^2 - z^2)\, a_z$	4M	CO1	L3
	b)	Determine the energy present in assembling 'n' number of charges? Find the energy in the system obtained by assembling the point charges -1 nC, 4 nC and 3 nC at the location (0,0,0), (0,0,1) and (1,0,0) respectively.	10M	CO1	L3
		OR			
2.	a)	Define electric dipole, electric flux line, and equipotential surface and electric potential.	6M	CO1	L1
	b)	State and determine the relationship between the electric field intensity and electric potential?	8M	CO1	L1,L3
		UNIT–II			
3.	a)	Explain the polarization in dielectrics?	6M	CO2	L1
	b)	Derive the continuity equation? Compare the relaxation time for copper (σ = 5.8 X 10^7 S/m, ϵ_r =1) and fused quartz ($\sigma = 10^{-17}$ S/m, ϵ_r =5.0)	8M	CO2	L2
		OR			
4.	a)	Explain and derive the concepts of Convection ,and conduction current density	10M	CO2	L3
	b)	Define Linear, Isotropic and Homogeneous Dielectrics?	4M	CO2	L1
		UNIT–III			
5.	a)	Explain the four Maxwell's equations for time varying fields in differential form for a good conducting medium.	6M	CO3	L1
	b)	A Conductor with cross-sectional area of $10cm^2$ carries a conduction current $0.2\sin 10^9 t$ mA. Given that σ = 2.5 X 10^6 S/m and ϵ_r = 6, calculate the magnitude of the displacement current density.	8M	CO3	L3
		OR			
6.	a)	State Ampere's circuit law and explain any one of its applications	6M	CO3	L1
	b)	Explain the Faraday's Law and show that the time-varying electric field is not conservative.	8M	CO3	L2
		UNIT–IV			
7.	a)	Explain the wave propagation in lossy dielectrics?	9M	CO4	L3
	b)	State and prove Poynting theorem	5M	CO4	L1,L2
		OR			
8.	a)	Describe the concept of Reflection of an EM wave encounters a perfect conductor at normal incidence?	6M	CO4	L3
	b)	Given a uniform plane wave in air as $\mathbf{E_i} = 40\cos(\omega t - \beta z)a_x + 30\sin(\omega t - \beta z)a_y$ V/m (i) Find $\mathbf{H_i}$. (ii) If the wave encounters a perfectly conducting plate normal to the z-axis at z=0, find the reflected wave $\mathbf{E_r}$ and $\mathbf{H_r}$.	8M	CO4	L4
		UNIT–V			
9.	a)	Explain the various applications of smith chart in Transmission line?	6M	CO5	L2
	b)	A lossless 60 Ω line is terminated by a load of 60 + j60 Ω. Use the Smith chart to calculate Z_{max} and $Z_{in,min}$. How far (in terms of λ) is the first maximum voltage from the load?	8M	CO5	L4
		OR			
10.	a)	Derive the transmission line equations?	8M	CO5	L3
	b)	Explain the condition for lossless and distortion less lines?	6M	CO5	L2

END

Hall Ticket Number :										

R-19

Code: 19AC44T

II B.Tech. II Semester Regular Examinations August 2021

Life Sciences for Engineers

(Common to EEE & ECE)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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			Marks	CO	Blooms Level
		UNIT–I			
1.	a)	Describe the cellular basis of life with suitable examples?	7M	1	2
	b)	How organisms are classified based on carbon and energy sources?	7M	1	1
		OR			
2.		What are prokaryotes and eukaryotes? Explain in detail about the differences between prokaryotes and eukaryotes?	14M	1	3
		UNIT–II			
3.		Explain the structure and functions of proteins with suitable examples?	14M	2	2
		OR			
4.	a)	What is fermentation? Describe the industrial applications of fermentation?	7M	2	1
	b)	What are antibodies and add a note on its structure?	7M	2	1
		UNIT–III			
5.		Explain about the tricarboxylic acid (TCA) cycle?	14M	3	2
		OR			
6.	a)	Explain the enzymatic steps involved in glycolysis?	7M	3	1
	b)	Write about synaptic and neuromuscular junctions?	7M	3	2
		UNIT–IV			
7.		What are the steps involved in DNA replication of eukaryotes?	14M	4	2
		OR			
8.		Explain the process of transcription and translation in eukaryotes?	14M	4	3
		UNIT–V			
9.	a)	Describe the salient features of restriction endonucleases?	7M	5	1
	b)	Explain the production of recombinant vaccines?	7M	5	2
		OR			
10.		Explain the various process of recombinant DNA technology?	14M	5	2

END

Hall Ticket Number :										

R-19

Code: 19AC42T

II B.Tech. II Semester Regular Examinations August 2021

Numerical Methods and Transform Techniques

(Common to EEE & ECE)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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			Marks	CO	Blooms Level
		UNIT–I			
1.	a)	Determine a real root of $x e^x = 3$ using Regula – Falsi method.	7M	1	3
	b)	Determine a root correct to three decimal places for the equation $x^3–x–2=0$ using Newton Raphson method.	7M	1	3
		OR			
2.	a)	The population of a certain town is shown in the following table Year X: 1931, 1941, 1951, 1961, 1971 Population Y: 40.62, 60.80, 79.95, 103.56, 132.65 Determine the population in 1981.	7M	1	3
	b)	Using Lagrange's formula, calculate $f(3)$ from the following table x: 0, 1, 2, 4, 5, 6 f(x): 1, 14, 15, 5, 6, 19	7M	1	3
		UNIT–II			
3.	a)	Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by using Trapezoidal rule and Simpson one third rule.	7M	2	5
	b)	Evaluate $\int_0^{\frac{\pi}{2}} \sqrt{\sin\theta}\, d\theta$ using Simpson's $\frac{3}{8}$ rule taking 6 equal intervals.	7M	2	5
		OR			
4.	a)	Using Taylor's series, determine y at $x = 0.1$ and $x = 0.2$ given $\frac{dy}{dx} - 2y = 3e^x, y(x) = 0. y(0) = 0$	7M	2	3
	b)	Using the fourth order Runge-Kutta method to determine $y(0.1)$, given $y' = xy + y^2, y(0) = 1.$	7M	2	3
		UNIT–III			
5.	a)	Determine the Taylor's series to represent the function f(z) = sin z about $z = -\pi/2$	7M	3	3
	b)	Determine the Laurent series expansion of the function $f(z) = \frac{7z-2}{(z+1)(z)(z-2)}$ in the region 1<|z+1|<3	7M	3	3
		OR			
6.	a)	Determine the residue at each pole of the function $f(z) = \frac{z^2-2z}{(z+1)^2(z^2+1)}$	7M	3	3

b) Evaluate $\oint_c \frac{z-3}{z^2+2z+5}dz$, where c is the circle given by (i) |z|=1 (ii) |z+1-i|=2 using residue theorem. 7M 3 5

UNIT–IV

7. a) Determine Fourier transform of f(x) defined by f(x) = $e^{-x^2/2}$, $-\infty < x < \infty$ or show that the Fourier transform of $e^{-x^2/2}$ is self reciprocal. 7M 4 3

b) Using Fourier transform of that pro
r integral, show $\int_0^{\infty} \frac{1-\cos\pi\lambda}{\lambda} \sin x\lambda d\lambda = \begin{cases} \frac{\pi}{2}, & 0 < x < \pi \\ 0, & if\ x > \pi \end{cases}$ 7M 4 3

OR

8. a) Determine the Fourier sine and cosine transform of $2e^{-5x} + 5e^{-2x}$ 7M 4 3

b) Determine the finite Fourier cosine transform of f(x) defined by $f(x) = \pi/3 - x + x^2/2\pi$, $0<x<\pi$. 7M 4 3

UNIT–V

9. a) Using shifting theorem, determine $Z(n+1)^2$ and $Z\left[\frac{1}{(n+2)(n+3)}\right]$ 7M 5 3

b) If $\frac{3z^2-4z+7}{(z-1)^3}$ is the Z – transform of u_n, then determine u_0, u_1, u_2 7M 5 3

OR

10. a) Determine the inverse Z – transform of $\frac{z}{(z+3)^2(z-2)}$ 7M 5 3

b) Solve the difference equation, using Z – transforms $y(n+2)+3y(n+1)+2y(n)=0$, given y(0) = 0, y(1) = 1 7M 5 3

END