Hall Ticket Number :										

R-17

Code: 7G343

II B.Tech. II Semester Supplementary Examinations March 2021

Analog Communication

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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			Marks	CO	Blooms Level
		UNIT–I			
1.	a)	Derive the equation and power relation of single tone modulation of AM system?	7M	1	I&VI
	b)	Consider the message signal m(t) containing the frequency components 100, 200 and 400 Hz. This message signal is applied to an SSB Modulator together with a carrier at 100 kHz with only USB retained. The coherent detector employed at the receiver uses a local oscillator that gives a sine-wave of frequency 100.02kHz. Determine the frequency components of the detector output.	7M	2	III
		OR			
2.	a)	Draw the circuit diagram of balanced ring modulator and explain its operation indicating all the waveforms and spectrums.	7M	1	I & II
	b)	Derive an expression for efficiency (η) of a single tone AM signal and show that η_{max} is 33.3% for μ = 1.	7M	2	III
		UNIT–II			
3.	a)	Explain about the spectral analysis of sinusoidal FM wave?	7M	3	I&IV
	b)	What is PLL? Explain demodulation of FM using first order PLL?	7M	1	I & II
		OR			
4.	a)	With a neat circuit diagram explain the direct method of FM generation?	7M	3	I & II
	b)	An Armstrong modulator is required in order to transmit an audio signal of bandwidth 100 Hz to 15 kHz. The narrowband phase modulator used for this purpose utilized crystal controlled oscillator to provide a carrier frequency of f_{c1} = 0.1 MHz. The output of the narrowband phase modulator multiplied by a multiplier with multiplication constant n_1 and passed to mixer with local oscillator frequency of f_{c2}=10.95 MHz. The desired FM wave at the transmitter output has a carrier frequency of 100 MHz, and frequency deviation Δf =75 kHz, which is obtained by multiplying the mixer output frequency with n_2 using another multiplier. Find n_1 and n_2. Assume that NBFM produce a frequency deviation of 20 Hz for the lowest baseband signal.	7M	2	III
		UNIT–III			
5.	a)	Define figure of merit and derive an expression for figure of merit of coherent reception of SSB	6M	4	I&VI
	b)	What is the purpose of pre-emphasis and de-emphasis filtering? Explain the filtering process with suitable sketches.	8M	4	I & V
		OR			
6.	a)	Derive an expression for figure of merit of an FM system?	8M	4	I&VI
	b)	The carrier reaching an envelope detector in an AM receiver has an RMS value equal to 1volt in the absence of modulation. The noise at the input of the envelope detector has a PSD equal to 10^{-3}Watts/Hz. If the carrier is modulated to a depth of 100% and message bandwidth, W=3.2 KHz, Find output signal to noise ratio.	6M	4	III

UNIT–IV

7.	a)	With the aid of the block diagram explain briefly the functions of each block in high-level AM transmitter?	8M	5	I & II
	b)	Calculate the image rejection ratio of a receiver having an IF of 450 KHz, If the Q's of the coils are 65, at an incoming frequency of 20 M Hz.	6M	5	III
		OR			
8.	a)	Draw the reactance modulated FM transmitter and explain its operation?	7M	5	I & II
	b)	What are the carrier frequency requirements in a radio transmitter, Explain?	7M	5	I

UNIT–V

9.	a)	Explain the principle of PAM generation with a help of block diagram. Derive the mathematical expressions?	7M	6	I & II
	b)	With a neat diagram, briefly explain the concept of Time Division Multiplexing?	7M	2	I & II
		OR			
10.	a)	Explain the generation of PWM, with suitable circuit and waveforms. Describe the demodulation of PWM.	7M	6	I & II
	b)	Determine the transmission bandwidth of a PAM system for transmission of voice signals of maximum frequency is 3 KHz. It is given that the sampling frequency is 8 KHz and the pulse duration is $0.1T_s$. Whereas T_s is sampling Period.	7M	6	III

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Hall Ticket Number :										

R-17

Code: 7GC43

II B.Tech. II Semester Supplementary Examinations March 2021

Complex Variables and Special Functions

(Common to EEE & ECE)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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			Marks	CO	Blooms Level
		UNIT–I			
1.	a)	Show that $\int_0^1 \frac{x^{m-1}(1-x)^{n-1}}{(x+a)^{m+n}} = \frac{\beta(m,n)}{a^n(1+a)^m}$	7M	2	II
	b)	Find all the roots of $Sin\, z = 2$	7M	2	I
		OR			
2.	a)	Show that $\int_0^\infty x^n e^{-a^2x^2} = \frac{1}{2a^{n+1}}\Gamma\left(\frac{n+1}{2}\right), n > -1$	7M	2	II
	b)	Find all values of z which satisfy $e^z = -2$.	7M	2	I
		UNIT–II			
3.	a)	Show that $f(z) = xy + iy$ is everywhere continuous but is not analytic.	7M	1	I
	b)	Find all the values of k such that $f(z) = e^x(Cos\, ky + i\, Sin ky)$ is analytic.	7M	1	I
		OR			
4.	a)	Show that the function $f(z) = \sqrt{\lvert xy \rvert}$ is not analytic at the origin, although Cauchy- Riemann equations are satisfied at the point.	7M	1	I
	b)	Find k such that $f(z) = x^3 + 3kxy^2$ may be harmonic and find its conjugate.	7M	1	I
		UNIT–III			
5.	a)	Evaluate $\int_C z^2 dz$ where C is the straight line segment from $O(z=0)$ to $A(z=2+i)$.	7M	2	V
	b)	Express $f(z) = \frac{1}{z}$ as the Taylor series at the point $z = 1$.	7M	2	II
		OR			
6.	a)	Verify Cauchy's theorem for the function $f(z) = z^2 + iz - 4$ if C is the square with the vertices at $1 \pm i$ and $-1 \pm i$.	7M	2	III
	b)	Express $f(z) = \left(\frac{1}{1-z}\right)\left(\frac{1}{(z-2)}\right)$ as the Laurent's series expansion in an annulus region $1 < \lvert z \rvert < 2$.	7M	2	II
		UNIT–IV			
7.	a)	Show that $\int_{-\infty}^{\infty} \frac{Cos\, ax}{x^2+1}\, dx = \pi e^{-a}, a \geq 0$.	7M	3	II
	b)	Use Rouche's theorem to identify the number of zeros of the polynomial $f(z) = 2z^4 - 2z^3 + 2z^2 + 2z + 11$, that lie inside the circle $\lvert z \rvert = 1$.	7M	3	III
		OR			
8.		Solve $\int_{-\infty}^{\infty} \frac{dx}{(x^2+a^2)(x^2+b^2)}$, $a > 0, b > 0, a \neq b$.	14M	3	III
		UNIT–V			
9.	a)	Illustrate the image of the infinite strip $0 < y < \frac{1}{2}$ under the transformation $w = \frac{1}{z}$.	7M	2	II
	b)	Find the bilinear transformation that maps the point $(0,1,\infty)$ in the z-plane onto the point $(-1,-2,-i)$ in the w-plane.	7M	2	I
		OR			
10.	a)	Illustrate the image of the rectangle $R: -\pi < x < \pi, \frac{1}{2} < y < 1$ under the transformation $w = Sin\, z$.	7M	2	II
	b)	Find the linear transformation that maps $z_1 = 0, z_2 = 1, z_3 = \infty$ onto $w_1 = -1, w_2 = -i, w_3 = 1$ respectively.	7M	2	I

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Hall Ticket Number :										

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Code: 7G344

II B.Tech. II Semester Supplementary Examinations March 2021

Field Theory and Transmission Lines

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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Marks

UNIT–I

1. a) Charges of 20nC and -20nC are located at (3,0,0) and (-3,0,0) respectively. Calculate the magnitude of Electric field intensity at origin. 7M

   b) Given the electric flux density, $D=0.3r^2a^r$ nC/m^2 in free space. Find Electric field intensity E at point P($r=2,\theta=25^o,\phi=90^o$) 7M

OR

2. a) i. Apply Gauss law to calculate Electric field due to point charge Q.
   ii. Assume zero potential at infinity, Determine the potential at a distance 'r' from the point charge Q. 8M

   b) Two point charges -4 μC and 5 μC are located at (2,-1, 3) and (0, 4, -2), respectively. Find the potential at (1, 0, 1) assuming zero potential at infinity. 6M

UNIT–II

3. a) Consider a conductor of uniform cross section S and length l connected to a source of electromotive force. Assume electric field E exists inside the conductor to sustain flow of current. Determine the resistance of conductor. 6M

   b) Define boundary conditions? Determine the boundary conditions at dielectric-dielectric interface. 8M

OR

4. a) Define capacitance of a capacitor. Determine the capacitance of parallel plate capacitor. 7M

   b) State Continuity of current equation. Derive Continuity equation. Express the Continuity equation for steady currents and what do you infer from this expression. 7M

UNIT–III

5. a) State Biot-Savarts law. How to determine the direction of magnetic field intensity. 6M

   b) Determine Magnetic field due to straight current carrying filament of finite length. 8M

OR

6. a) State Amperes Law. Apply Amperes circuit law to determine magnetic field for Infinite sheet of current. 8M

   b) Relate Scalar and Vector magnetic potentials to Magnetic field Intensity. 6M

UNIT–IV

7. Compute the following parameters for moist soil $\epsilon_r = 16$, and $\sigma = 5mS/m$ at frequency of 100MHz.
   i. Propagation constant $\hat{\gamma}$
   ii. Attenuation constant α
   iii. Phase constant β
   iv. Intrinsic impedance $\hat{\eta}$
   v. Skin depth δ_c
   vi. Tangent loss tanδ 14M

OR

8. a) Explain skin depth and derive expression for depth of penetration for good conductor. 7M
   b) Find skin depth for a copper conductor at frequency 1MHz. The conductivity of copper is $5.8*10^7$S/m and μ_r=1. 7M

UNIT–V

9. a) Explain the meaning of the terms characteristic impedance and propagation constant of a uniform transmission line and obtain the expressions for them in terms of parameters of line. 7M
   b) Calculate the reflection coefficient and VSWR for a 50Ω lines, terminated with
   i) matched load. ii) short circuit. 7M

OR

10. a) Derive the expression for the input impedance of a transmission line of length L 7M
    b) Explain the applications of smith chart. 7M

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Hall Ticket Number :										

R-17

Code: 7GA41

II B.Tech. II Semester Supplementary Examinations March 2021

Managerial Economics and Financial Analysis

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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		Marks	CO	Blooms Level

UNIT–I

1. Define managerial economics. Also explain its important characteristics. 14M

OR

2. What do you mean by price elasticity of demand? What are its types? Discuss. 14M

UNIT–II

3. What is meant by law of diminishing returns? What are its assumptions? Explain. 14M

OR

4. Write a short note on cost output relationship in long run. 14M

UNIT–III

5. What are the important features underlying perfect markets? Discuss. 14M

OR

6. What do you understand by a joint stock company? What are its merits? Explain. 14M

UNIT–IV

7. What are the various sources of long term finance? Explain each of them in detail. 14M

OR

8. A project involves an initial outlay of Rs.1, 29,600. Its working life is expected to be 3years. The cash inflows are likely to be as follows: Year 1is Rs.64, 000, Year 2is Rs.56, 000 and Year 3is Rs.24, 000. Compute the internal rate of return. 14M

UNIT–V

9. What do you mean by final accounts? Explain in detail. 14M

OR

10. You are given the trading and profit & loss account of **a** company for the year ended 31st March201**7**.

Trading and Profit & Loss Account			
Dr			Cr
Particulars	Rs.	Particulars	Rs.
To Opening Stock	5,00,000	By Sales	20,00,000
To Purchases	11,00,00	By Closing Stock	6,00,000
To Wages	0		
To Factory Overheads	3,00,000		
To Gross Profit(c/d)	2,00,000		
	5,00,000		
To Administrative Expenses	26,00,00 0	By Gross Profit(b/d)	26,00,000
To Selling &Distribution Expenses	75,000	By Dividend on Investment	5,00,000
To Interest on debentures	50,000	By Profit on Sale of Furniture	10,000
To Depreciation	20,000		20,000
To loss on sale of motor car	60,000		
To Net Profit	5,000		
	3,20,000		
	5,30,000		5,30,000

14M

Calculate

a) Gross profit ratio
b) Net Profit ratio
c) Operating ratio
d) Operating profit ratio

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Hall Ticket Number :										

R-17

Code: 7G342

II B.Tech. II Semester Supplementary Examinations March 2021

Pulse and Digital Circuits

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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			Marks	CO	Blooms Level
		UNIT–I			
1.	a)	Prove that for any periodic input wave form the average level of the steady state output signal from RC high pass circuit is always zero.	7M	CO1	
	b)	Derive the expression for percentage tilt(P) of a square wave output of RC high pass circuit.	7M	CO1	
		OR			
2.	a)	Analyze the high pass RC circuit for the following inputs, with the help of wave forms i) Exponential input ii) Ramp input	6M	CO1	
	b)	Explain how a low pass RC network acts as attenuator and ringing circuit	8M	CO1	
		UNIT–II			
3.	a)	Explain the working of an Emitter coupled clipper with circuit diagram.	8M	CO1	
	b)	Write a short note on Diode switching times	6M	CO1	
		OR			
4.	a)	Draw the diode comparator circuit and explain the operation of it when ramp input signal is applied.	7M	CO1	
	b)	Explain how a transistor can be used as a switch	7M	CO1	
		UNIT–III			
5.	a)	Explain the operation of Fixed-Bias Bistable multivibrator with circuit diagram and waveforms.	7M	CO2	
	b)	Design collector coupled monostable multivibrator for the following specifications. VCC=10V, VBB= -5V, IC(sat)= 10mA, hFE=20 ,VBE(off)= -0.5V, Output pulse width tp= 200μS. (assume Si transistors)	7M	CO2	
		OR			
6.	a)	Explain how an Schmitt trigger circuit acts as a comparator	7M	CO2	
	b)	Design the Astable Multivibrator to generate 1 KHz square wave. The supply voltage VCC=10V, IC(sat)=10mA hfe=50 and assume Si transistors.	7M	CO2	
		UNIT–IV			
7.	a)	Explain briefly the different methods of generating time-base waveform	6M	CO3	
	b)	With the circuit diagram explain current time base generator.	8M	CO3	
		OR			
8.	a)	Explain about the linearly correction through adjusting of driving waveform.	7M	CO3	
	b)	Explain how UJT is used for sweep circuit?	7M	CO3	
		UNIT–V			
9.	a)	Explain the basic operation of sampling gate.	8M	CO4	
	b)	Explain the operation of unidirectional diode gate.	6M	CO4	
		OR			
10.	a)	Draw and explain the circuit diagram of integrated positive DTL NAND gate.	7M	CO4	
	b)	Compare the RTL and DTL logic families in terms of Fan out, propagation delay, power dissipated per gate and noise immunity.	7M	CO4	

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Hall Ticket Number :										

R-17

Code: 7G341

II B.Tech. II Semester Supplementary Examinations March 2021

Random Variables and Random Processes

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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			Marks	CO	Blooms Level
		UNIT–I			
1.	a)	Explain the concept of Total probability and Baye's Theorem	8M	CO1	L2
	b)	An experiment is throwing a coin trice, the random variable represents the number of heads comes out. Find and sketch the distribution and density functions.	6M	CO1	L1
		OR			
2.	a)	A lot of 100 semiconductor chips contains 20 that are defective. Two chips are selected at random, without replacement, from the lot. i. What is the probability that the second one selected is defective given that the first one was defective. ii. What is the probability that both are defective?	8M	CO1	L1
	b)	Explain the Gaussian random variable.	6M	CO1	L2
		UNIT–II			
3.	a)	Show that $\pm_X{}^2 = \frac{(b-a)^2}{12}$, where X is a random variable uniformly distributed over (a,b).	8M	CO2	L2
	b)	State and Prove the Chebyshev's inequality.	6M	CO2	L5
		OR			
4.	a)	What is the expected value of an exponential random variable X?	8M	CO2	L1
	b)	Determine the mean and variance of new random variable Y=2X+3, where X is Gaussian random variable.	6M	CO2	L5
		UNIT–III			
5.	a)	Define the joint density function and list out its properties.	8M	CO2	L1
	b)	State and prove Central Limit Theorem.	6M	CO2	L5
		OR			
6.	a)	Random variables X and Y have respective density functions $f_X(x) = \frac{1}{a}[u(x)-u(x-a)]$ & $f_Y(y) = bu(y)e^{-by}$ where $a>0, b>0$. Solve and sketch the density function of $W = X+Y$ if X and Y are statistically independent.	8M	CO2	L3
	b)	Explain about the jointly Gaussian random variables.	6M	CO2	L2
		UNIT–IV			
7.	a)	Explain the concept of Random process.	8M	CO3	L2
	b)	Explain about stationary random process.	6M	CO3	L2
		OR			
8.	a)	Explain Time Averages and Ergodocity.	8M	CO3	L2
	b)	State and prove the properties of Auto correlation function.	6M	CO3	L5
		UNIT–V			
9.	a)	Develop the relationship between the Auto correlation function and Power spectral density.	8M	CO4	L3
	b)	Determine the cross correlation function corresponding to the cross power spectrum $S_{XY}(\omega) = \frac{8}{(\alpha+j\omega)^3}$	6M	CO4	L5
		OR			
10.	a)	Develop that $S_{yy}(\omega) = S_{xx}(\omega)\lvert H(\omega)\rvert^2$.	8M	CO4	L3
	b)	Determine the transfer function of two port RC Network	6M	CO4	L5

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