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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

May 2024 Semester End Main Examinations

Programme: B.E. **Semester: V**
Branch: Electronics and Communication Engineering **Duration: 3 hrs.**
Course Code: 19EC5PCANT **Max Marks: 100**
Course: Antenna Theory

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1 a) Explain the following **06**
i. Radiation Resistance   ii. Beam Efficiency   iii. Antenna Temperature

b) Derive the relation between transmitted power & received power of a radio communication link using the concept of effective aperture. **08**
Two space crafts A & B are separated by 100Mm. Each has an antenna with directivity of 1000 at an operating frequency of 2.5 GHz. If Craft A's receiver requires 20dB over 1pW, what transmitter power is required on B to achieve this signal level?

c) Obtain the relation between effective aperture of an antenna and the directivity. Find the effective aperture of an idealized isotropic antenna? **06**

UNIT - II

2 a) Explain the purpose of folded dipole antenna and how it is achieved. **05**

b) Using spherical coordinate system, obtain far field components of short electric dipole antenna. **08**

c) Obtain the far filed components of a loop antenna such that it is same for both circular & square loop antenna. The area of a square loop is same as that of area of a circular loop antenna. **07**

UNIT - III

3 a) Define antenna array. Which are the parameters that determine the pattern? **06**

b) Obtain the array factor of linear array of N isotropic point sources of equal amplitude and spacing. **07**

c) An array of 4 isotropic antennas is placed along a straight line. Distance between adjacent elements is half wavelength. The peak is to be obtained in a direction 60^0 from the axis of the array. What should be the phase difference between adjacent elements? Complete the pattern and find BWFN and HPBW. **07**

OR

4 a) Identify and analyze a suitable array system of two isotropic point sources in which the peak and null of the radiation pattern are at 180^0 and 0^0 respectively. **08**

   b) Identify and explain the principle with an example that can be used to analyze an array of non-isotropic point sources. **06**

   c) What are Phased arrays? Explain any one type of Phased array. **06**

UNIT - IV

5 a) With neat diagram, explain the following with respect to rectangular horn antenna. **05**
   - i)   Flare angle
   - ii) Path length difference
   - iii) E-plane aperture
   - iv) H-plane aperture

   b) Describe the salient features of Micro strip Patch antenna. **07**

   c) Obtain the expression for impedance of slot antenna in terms of complementary dipole antenna. Compute the slot impedance Zs, given dipole impedance Zd =(73+j42.5)Ω **08**

OR

6 a) Define slot antennas. What are its applications? **05**

   b) Determine the length L, H-plane aperture and flare angles θ_E and θ_H of a pyramidal horn for which the E-plane aperture a_E = 10λ. The horn is fed by a rectangular wave guide with TE$_{10}$ mode. Let δ = 0.2λ in the E-plane and 0.375 λ in the H plane. What are the beam widths and what is the directivity? **07**

   c) Identify and Explain the principle with illustrations that can be used to find impedance of complementary screen in antennas. **08**

UNIT - V

7 a) A 16 turn helical beam antenna has a circumference of λ and turn spacing of λ/4. Compute i) HPBW, ii) Axial ratio, iii) Gain, iv) Power pattern **05**

   b) Explain the principle of Parabolic reflector antenna and various types of feed used. **09**

   c) A 64 m diameter dish antenna operating at a frequency of 1.43 GHz is fed by a non-directional antenna. Calculate its HPBW, BWFN and Gain in dB. **06**

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May 2024 Semester End Main Examinations

Programme: B.E.
Branch: ES Cluster (EI/MD/EC/EE/ET)
Course Code: 19ES5CCDSP
Course: Digital Signal Processing

Semester: V
Duration: 3 hrs.
Max Marks: 100

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1 a) Find the 4-point DFT of a sequence x[n]= {1, -1, 1, -1}. Also using time shifting property, find the DFT of the sequence y[n]= x((n-2))₄ — **08**

   b) Let x[n] be a real valued sequence of length-N and its N-point DFT is given by X(k) — **06**

   show that a) $X(N-k)=X^*(k)$ b) X(0) is real c) If N is even, X(N/2) is real

   c) Find the energy of the 4-point Sequence — **06**

   $$x[n] = \sin\left(\frac{2\pi}{N}n\right) \quad 0 \le n \le 3$$

OR

2 a) [n]= { 1, 2, 0, 3, -2, 4, 7, 5 } — **08**

   Evaluate the following:

   i) X(0)   ii) X(4)   iii) $\sum_{k-0}^{7} X(k)$ iv) $\sum_{k-0}^{7} |X(k)|^2$

   b) For the sequences — **12**

   $$x_1[n] = \cos\left(\frac{2\pi n}{N}\right), \qquad x_2[n] = \sin\left(\frac{2\pi n}{N}\right), \qquad 0 \le n \le N-1$$

   Find the N-point circular convolution of $x_1[n] \otimes x_2[n]$

UNIT - II

3 a) Let x(n)= (n+1), $0 \le n \le 9$ and h(n)= { 1, 0, -1}. Implement the overlap add method to compute $y(n) = x[n] \otimes h[n]$ — **06**

   b) Sample the signal x(t) = 1+ cos 2πt at its Nyquist rate and obtain its discrete sequence. Determine 4-point DFT using DIT-FFT algorithm. — **06**

c) Find the 4-point circular convolution of **08**

x(n)={ 1, 1, 1, 1} and h(n)= { 1, 0, 1, 0 } using DIF-FFT algorithm

UNIT - III

4 a) The following causal IIR digital transfer function was designed using the impulse invariant method with T=0.3 second. **06**

$$H(z) = \frac{2Z}{Z - e^{-0.9}} + \frac{3Z}{z - e^{-1.2}}$$

Determine its parent causal analog transfer function

b) Explain the effect of warping on magnitude and phase response of IIR filter design using Bilinear Transformation technique ? **06**

c) Obtain the cascade and parallel form realization structure for the system function **08**

$$H(z) = \frac{1 + \frac{1}{4}Z^{-1}}{(1 + \frac{1}{2}Z^{-1})(1 + \frac{1}{2}Z^{-1} + \frac{1}{4}Z^{-2})}$$

OR

5 a) Design a digital LPF using BLT to meet the following specifications **10**

    i)   Monotonic passband and stopband

    ii)   -3dB cutoff at 0.5π rad

    iii)   -15 dB attenuation at 0.75π radians

b) Design lowpass 1.453 rad/sec bandwidth chebyshev filter with the following specifications **10**

i) Acceptable passband ripple of +1 dB

ii) Cutoff random frequency of 1.4531 rad/sec

iii) Stop band attenuation of 20 dB or greater beyond 6.1536 rad/sec

UNIT - IV

6 a) Design an FIR Filter (Low Pass) using rectangular window with pass band gain of 0 dB, cut off frequency of 200 Hz sampling frequency of 1 KHz. Assume the length of the impulse response as 7. Determine all the filer coefficients. **08**

b) Design a lowpass FIR filter using frequency sampling technique using cutoff frequency of $\pi/2$ rad/sec. The filter should have linear phase and length of 17. **08**

c) Draw the Direct form and linear phase structure for an FIR Filter **04**

$$h(n) = \delta(n) + \frac{1}{2}\delta(n-1) - \frac{1}{4}\delta(n-2) + \frac{1}{2}\delta(n-3) + \delta(n-4)$$
characterized by

UNIT - V

7 a) Explain the system identification method using adaptive filter **08**

b) Explain the function of echo canceller in digital communication system **07**

c) Describe the process of sampling rate reduction by an Integer factor **05**

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May 2024 Semester End Main Examinations

Programme: B.E.   **Semester: VIII**
Branch: ES CLUSTER(EC,EE,ET,MD,EI)   **Duration: 3 hrs.**
Course Code: 19ES8HSIPL   **Max Marks: 100**
Course: Intellectual Property Rights and Cyber Law

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

				CO	PO	Marks
			UNIT – I	**CO**	**PO**	**Marks**
1	a)		Define property and Intellectual Property? Discuss the importance of Intellectual Property in the modern world.	CO2	PO 7	**8**
	b)		Discuss the Criteria for patentability. List Non patentable inventions.	CO 1	PO 8	**12**
			UNIT – II			
2	a)		Discuss the Procedure for obtaining patent with a neat flow chart.	CO 1	PO 8	**10**
	b)		Define and Differentiate License and Assignment. Discuss Compulsory License and justify how the Compulsory license will protect the interest of the society.	CO 2	PO 7	**10**
			OR			
3	a)		What do you mean by Specification? Discuss the need to file a Provisional specification. Also Discuss the contents of a complete specification.	CO 1	PO 8	**10**
	b)		Discuss the principles of construction of a specification. Can a specification be amended after it has been filed? If yes, then when can it be amended? Explain	CO 1	PO 8	**10**
			UNIT - III			
4	a)		Discuss the characteristics of copyrights. Mention some of the works for which copyright can be obtained.	CO 3	PO 6	**10**
	b)		Discuss remedies against infringement of trade mark	CO 3	PO 6	**6**
	c)		Distinguish between Contract of service and contract for service	CO 1	PO 8	**4**
			OR			
5	a)		Discuss the acts which constitute infringement of a copyright and how do you determine infringement in artistic work?	CO 3	PO 6	**10**
	b)		Discuss the Nature of rights conferred by copyright.	CO 1	PO 8	**10**

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			UNIT – IV			
	6	a)	Define Cyber law and Cyberspace. Why cyber law is important? Explain	*CO 3*	*PO 6*	**10**
		b)	Discuss Cybersquatting. What are the civil remedies for cybersquatting?	*CO 3*	*PO 6*	**10**
			UNIT – V			
	7	a)	Discuss Spam and its effects on the public world.	*CO 2*	*PO 7*	**08**
		b)	Discuss in detail E-Courts of India.	*CO 3*	*PO 6*	**06**
		c)	How to protect Indian Children online? Explain	*CO 3*	*PO6*	**06**

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