

B.E. Fourth Semester (Electronics & Tele. communication / Electrical Engineering) (CGS)

10599 : Communication Engineering - I : 4 XT 01 / 4 XN 01

P. Pages : 2

Time : Three Hours



AU - 2592

Max. Marks : 80

- Notes :
1. Answer **three** question from Section A and **three** question from Section B.
 2. Due credit will be given to neatness and adequate dimensions.
 3. Assume suitable data wherever necessary.
 4. Illustrate your answer necessary with the help of neat sketches.

SECTION - A

1. a) Explain with an example and neat sketches the following signals: 6
i) Periodic and Non periodic signals ii) Analog and digital signals
iii) Deterministic and random signals
b) What do you mean by Noise Factor and Noise Figure? 7
For three cascade amplifier stages, each with noise figure of 3dB and power gain of 10dB, determine the total Noise figure?

OR

2. a) Sketch the single sided frequency spectrum of the following signal. 6
i) $f(t) = 4 \sin 100\pi t$ ii) $f(t) = 3 \sin 100\pi t + \sin 120\pi t$
b) Explain in brief internal and external noise. 7
3. a) Find the Fourier transform of the following function and sketch the magnitude spectrum. 9
i) $f(t) = e^{-at} \cdot u(t)$, where $u(t)$ is unit step function.
ii) $f(t) = e^{-a|t|}$, where $-1 < t < 1$
iii) $f(t) = A$, where $A = \text{constant}$.
b) State and prove the time convolution theorem. 5

OR

4. a) State and prove the following properties of Fourier transform. 9
i) Symmetry or duality ii) Scaling property
iii) Frequency shift property
b) State and prove the Rayleigh's energy theorem. 5
5. a) What is probability density function? Explain its properties. 7
b) Find the value of λ such that function $f(x)$ is valid probability density function. 6
 $f(x) = \lambda(x-1)(2-x)$ for $1 \leq x \leq 2$
 $= 0$ otherwise

OR

6. a) Define the following terms: 6
i) Stationary and Non-Stationary Random Process.
ii) Ergodic Process.
iii) Ensemble Average
b) Consider a continuous random variable with probability density function. 7
 $f(t) = 1+t$ for $-1 \leq t \leq 0$
 $= 1-t$ for $0 \leq t \leq 1$
Find the mean of random variable.

SECTION - B

7. a) Explain following terms: 6
i) Virtual height ii) Critical Frequency
iii) Maximum usable frequency
- b) Discuss the tropospheric propagation. Prove that the range of tropospheric propagation depends on height of transmitting and receiving antenna. 7
- OR**
8. a) Explain the following terms with neat sketches. 6
i) Skip distance ii) Skip zone
iii) Fading
- b) What do you mean by ionosphere? What causes it? Explain why F_2 layer of the ionosphere does not disappear at night? 7
9. a) What do you mean by transmission line? Draw the general electrical equivalent circuit of transmission line. Explain how general electrical equivalent circuit of transmission line be reduced to simplified circuit for a radio frequency line. 7
- b) Define the term characteristic impedance of transmission line? 7
What is the minimum value of characteristic impedance of an air dielectric parallel wire line could have?
- OR**
10. a) What do you mean by standing waves? Why it is called as standing waves? Explain with the phasor diagram. Discuss its pattern for open and short circuited transmission lines. 7
- b) A piece of coaxial cable has a 75Ω characteristic impedance and a nominal capacitance of 69 pF/m . What is its inductance per meter? 7
If the dielectric of the inner conductor is 0.584 mm . And the dielectric constant of the insulation is 2.23 , what is the outer conductor diameter?
11. a) Define the following terms: 6
i) Directive gain of an antenna ii) Antenna polarization
iii) Antenna Beamwidth
- b) For an antenna with input power, $P_i = 100 \text{ Watts}$, rms current $I = 2 \text{ Amp.}$ and effective resistance $R_e = 2\Omega$, Determine: 7
i) Antenna Radiation Resistance ii) Antenna efficiency
iii) Power radiated from the antenna, P_r .
- OR**
12. a) What do you mean by half wave dipole? Draw the voltage and current distribution on half wave dipole and show its radiation pattern in horizontal and vertical plane. What is its input impedance? 7
- b) Explain the difference between driven and parasitic elements in an antenna array. What is the difference between a director and a reflector? 6
