Reg. No. ☐☐☐☐☐☐☐☐

IV Semester B.Sc. Degree Examination, July/August - 2024
ELECTRONICS
Electronics Communication - I
(NEP Scheme -2020)
Paper : IV(ELE-CT4)

Time : 2½ Hours   **Maximum Marks : 60**

Instructions to Candidates:

1. Answer All questions of Part 'A', any Four from part 'B', and any Four from Part 'C'.

2. Answer all questions of Part - 'A' in any one page, the same questions answered multiple times will not be considered for evaluation.

PART - A

1. Answer All the subdivisions.   **(12×1=12)**

   i.   Johnson/white noise is also known as

       a.   Thermal noise.   b.   Shot noise.

       c.   Transit time noise   d.   Atmospheric noise.

   ii.   Which layer of atmosphere is helpful for skywave propagation?

       a.   Troposphere   b.   Mesosphere.

       c.   Ionosphere   d.   Exosphere

   iii.   Antenna which radiates signal uniformly in all directions is called.

       a.   Unidirectional Antenna.

       b.   Bidirectional Antenna.

       c.   Narrow band Antenna.

       d.   Isotropic Antenna.

iv. In Amplitude modulation, useful power is carried by

    a. Only carrier component   b. Only single sideband.

    c. Both sidebands   d. The carrier and the sidebands.

v. Pre - emphasis network is used in - transmitter.

    a. AM   b. FM

    c. PM   d. All the above

vi. The sequence of operations in PCM.

    a. Sampling, quantizing, encoding.   b. Quantizing, encoding, sampling.

    c. Quantizing, sampling, encoding   d. None of the above.

vii. In satellite communication uplink frequency is _ the down link frequency.

    a. Less than   b. Greater than

    c. Equal to   d. None

viii. An echo in a radar system is referred as

    a. Transmitted signal   b. Trans receive signal

    c. Received signal   d. None of the bove.

ix. When the source and the target are moving away from each other, then the apparent frequency will.

    a. Decrease   b. No change

    c. Increases   d. Fluctuate.

x. The refractive index of the core is - its cladding refractive index

    a. Less than   b. Equal to

    c. Greater than   d. Less than or equal to

xi. How does the refractive index vary in Graded Index fiber?

    a. Varies Tangentially   b. Varies Radially.

    c. Varies Longitudinally   d. Varies Transversely.

xii. Which of the following is used as an optical receiver in fibre optic communications

    a. APD   b. Tunnel diode.

    c. Laser diodes   d. LEDs.

PART - B

Answer any Four question.   **(4×7=28)**

2. a) Mention different types of wave propagation. Explain any one of them mentioning its advantages and disadvantages.

    b) Draw the equivalent circuit of an ideal transmission line.   **(5+2)**

3. a) Define the following terms with respect to an Antenna.

    i)   Band width

    ii) Beam width.

    iii) Polarisation.

    iv) Directivity

    v)   Efficiency.

    b) Draw the radiation pattern of antenna for length equal to $\lambda/2$, λ.   **(5+2)**

4. a) With a block diagram, explain the satellite uplink system.

    b) Write any two advantages of geostationary satellites.   **(5+2)**

5. Draw the block diagram of FM CW Radar and explain the function of each block.

6. a) Explain the principle of light propagation through the fiber.

    b) Mention the losses in OFC and explain any one of the losses.   **(2+5)**

PART - C

Answer any Four questions.   **(4×5=20)**

7. An amplifier operating over the frequency range from 18 to 20MHZ has a 10KΩ input resistor. What is the noise voltage at the input to this amplifier if the ambient temperature is 27°C.

8. A horizontal wire antenna of length 3 meters is used to radiate at 15 MHz. Calculate the radiation resistance and the efficiency of the antenna, if the loss resistance of the antenna is 10Ω.

9. An FM is represented by the voltage equation $v(t) = 20\cos(10^9\,t + 4Sin^{10}\,4)$. Determine the following :

   a) Carrier frequency.

   b) Modulation index.

   c) Modulating frequency.

   d) Carrier swing.

10. Calculate the path loss incurred in a sattelite system operating at

    i. 8GHz at a distance of 18000 Km. and

    ii. 12 GHz at a distance of 15000 Km.

11. A Radar operating at 5GHz uses a peak power of 4MW. Its Radar cross section is $1m^2$, minimum receivable power is $2 \times 10^{-13}W$ and its capture area is $7m^2$. Calculate the maximum range.

12. The Numerical aperture of an optical fiber is 0.2 when surrounded by air. Determine the refractive index of its core, given the refractive index of the cladding is 1.59. Also find the acceptance angle when the optical fiber is in water. Assume the refractive index of water is 1.33.

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