V Semester B.Sc. Examination, March/April 2022
(CBCS) (F+R) (2016-17 and Onwards)
ELECTRONICS – V
EL-501 : Communication – I

Time : 3 Hours

Max. Marks : 70

Instructions : i) Answer **all** questions in Part – **A, any five** questions from
Part – **B** and **any four** questions from Part – **C**.
ii) Answer **all** questions from Part – **A** in **any one** page,
the **same** question answered multiple times will not be
considered for valuation.

PART – A

Answer **all** the sub-divisions : (15×1=15)

1. i) The thermal noise voltage in a resistor is proportional to

   a) R b) $\sqrt{R}$

   c) R^2 d) Independent of R

   ii) Indicate the true statement. Simplified equivalent circuit representation of
   transmission at RF frequencies consists of

   a) R, L, C and G b) R and G

   c) L and G d) L and C

   iii) Frequencies in the UHF range normally propagate by means of

   a) Ground waves b) Sky waves

   c) Surface wave d) Space wave

   iv) Modulation helps in achieving

   a) Wireless communication b) Separation between channels

   c) Incorporation of more channels d) All of these

   v) In DSBSC transmission power saved is

   a) 0.666% b) 0.833%

   c) 0.333% d) 0.166%

P.T.O.

vi) Pre-emphasis deals with
   a) Emphasizing low frequency components
   b) Emphasizing high frequency components
   c) Emphasizing a band of mid frequency components
   d) Limiting low frequency components

vii) In varactor diode FM modulator, varactor diode is used as
   a) Fixed capacitor   b) Voltage variable capacitor
   c) Forward biased diode   d) None of these

viii) If a radio receiver amplifies all the signal frequencies equally well, it is said to have high
   a) Sensitivity   b) Selectivity
   c) Distortion   d) Fidelity

ix) In a radio receiver, AGC works by
   a) tuning the local oscillator
   b) adjusting the gain of RF and IF amplifiers
   c) tuning the IF amplifier
   d) adjusting frequency of master oscillator

x) The function of the antenna is to
   a) convert photons to electrons   b) convert electrons to photons
   c) converts electrons to neutrons   d) Both (a) and (b)

xi) _____ of the following is the correct statement for isotropic radiation.
   a) It is a point source radiator   b) It radiates uniformly in all directions
   c) Maintains uniform intensity   d) All the above

xii) _____ polarisation is provided by helical antenna.
   a) linear   b) circular
   c) elliptical   d) all of these

xiii) Brightness of an image is known as
   a) Radiance   b) Chrominance
   c) Reflectance   d) Luminance

xiv) Primary Colors used in Colour T.V. :
   a) Red, Blue, Green   b) White, Black, Red
   c) Magenta, Yellow, Cyan   d) White, Red, Blue

xv) The advantage/s of HDTV :
   a) Improved colour quality b) Wide screen viewing
   c) Include 'smart' features d) All the above

PART – B

Answer **any five** questions.   (5×7=35)

2. a) Define :
   i) External noise
   ii) Noise factor.

   b) Explain the two secondary constants of a transmission line.   (2+5)

3. a) Explain the propagation of electromagnetic waves as space waves.

   b) Write any four differences between AM and FM.   (3+4)

4. Derive an expression for instantaneous voltage of an AM signal. Draw the
   frequency spectrum.   7

5. Explain the working of varactor diode modulator with necessary circuit
   diagram.   7

6. With a block diagram, explain the working of FM superheterodyne receiver. 7

7. Derive an expression for total power radiated by a dipole antenna.   7

8. With respect to antenna explain the terms :   7
   i) bandwidth
   ii) directive gain
   iii) polarization.

9. Explain the block diagram of monochrome TV transmitter.   7

PART – C

Answer **any four** questions :   (4×5=20)

10. Calculate the thermal noise voltage generated by a 75 Ω resistor at a temperature
    of 27°C for a bandwidth of 0.8 MHz.

11. A FM wave is represented by $V_{FM} = (25.12 \times 10^6 t + 9 \sin 94.2 \times 10^2 t)$ Calculate :
    a) Carrier frequency
    b) Modulating frequency
    c) Frequency deviation
    d) Carrier swing.

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

13. Draw the radiation pattern and current distribution for an antenna of length.

   a) λ

   b) λ/2

   c) 3λ/2

14. Calculate the horizontal and vertical scanning frequencies of interlaced scanning in the following TV standards :

   a) 625 lines per frame and 25 frames per second

   b) 525 lines per frame and 30 frames per second.

15. In a colour TV system, the signal voltages corresponding to the three primary colours are given as green = 3mV, blue = 2mV and red = 1mV. What are the voltages corresponding to Y, I and Q signals ?

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