NG2-109

December-2015

M.Sc., Sem.-III

504 : Physics

(Electronic Communication – I)

Time : 3 Hours]   **[Max. Marks : 70**

Instructions :   (1)   Attempt **all** questions.

             (2)   Symbols carry their usual meanings.

             (3)   Scientific calculators are allowed.

1.   (A)   (i)   With help of a circuit diagram describe primary transmission line parameters.   **3**

          (ii)   A coaxial cable having an inner diameter of 0.025 mm and using an insulator with dielectric constant of 2.56 is to have a characteristic impedance of 2000 Ω. What must be outer conductor diameter ? Assume high frequency transmission. What do you infer from this example ?   **4**

OR

          (i)   With help of equation and phasor diagram discuss variation of voltage as function of distance on a transmission line.   **3**

          (ii)   A high frequency open wire transmission line has a distributed capacitance of 0.08 μF/km and distributed inductance of 7.2 mH/km. It is connected to a load of $(200 + j100)$ Ω. Calculate SWR.   **4**

   (B)   (i)   From the basic equations of voltage and current on a dissipationless line, obtain expression for impedance on a short circuited line, then sketch its variation with distance.   **4**

          (ii)   Describe how standing wave ratio and phase constant of a coaxial cable can be measured in laboratory   **3**

OR

(i) Explain how standing waves are formed on a transmission line. Define standing wave ratio and derive an expression for it. **4**

(ii) What is a stub line ? Describe how stub line can be used for impedance matching. **3**

2. (A) Describe the mechanism by which ionosphere affect the wave propagation. Derive an expression for dielectric constant of ionospheric medium, and then discuss how refraction takes place from ionosphere. **7**

OR

Derive an expression for field strength in case of tropospheric wave (space wave) propagation. Mention significance of individual terms in the equation.

(B) (i) Discuss various orbits used for satellite communication, mention their merits and demerits. **4**

(ii) Explain any one method of multiple accessing. **3**

OR

(i) With help of a block diagram describe transponder used in satellite communication. **4**

(ii) Discuss the choice of frequency for satellite communication, mention their advantages and disadvantages.

3. (A) Draw circuit of a JFET Balanced Modulator and show how double sideband suppressed carrier (DSBSC) signal is generated here. **7**

OR

Define frequency modulation. Derive the expression of instantaneous voltage for frequency modulated wave. Draw its frequency spectrum. **7**

(B) Define pulse code modulation. How is signal to quantization noise ratio (S/N_q) related to number of quantized levels (L) ? **7**

OR

Draw circuit of Foster -Seeley discriminator and explain how it demodulates FM wave. Draw its response curve. **7**

4. (A) What is meant by bit timing recovery ? Discuss Early - Late gate circuit for bit timing recovery. **7**

OR

Name two types of carrier recovery circuits. Why are they needed ? Discuss Squaring Loop method for carrier recovery. **7**

(B) Describe Phase Shift Keying (PSK). Discuss how PSK can be generated and detected. **7**

OR

Describe Amplitude Shift Keying (ASK). Draw its frequency spectrum. **7**

5. Answer the following (each question carry **one** mark). **14**

(i) A quarter wave line inverts the load and a half wave line _____ the load.

(ii) Range of standing wave ratio on coaxial lines is ___ ___.

(iii) If you know the normalized impedance form Smith chart, how actual impedance can be calculated ?

(iv) What is meant by critical frequency of ionosphere ?

(v) FM radio broadcasting is based on _____ propagation

(a) ground wave (b) sky wave (c) space wave (d) free space wave

(vi) Why is it essential to have chargeable batteries in satellite ?

(vii) What is Effective Isotropic Radiative Power (EIRP) of a communication satellite ?

(viii) List two advantages of single sideband modulation.

(ix) A telephone signal has a cut off frequency of 4 kHz. Find Nyquist sampling frequency for this signal.

(x) Armstrong method is a direct method of FM generation. TRUE or FALSE.

(xi) What is Continuous Phase Frequency Shift Keying (CPFSK) ?

(xii) What is the bandwidth of a frequency modulated wave according to Carson's Rule ?

(xiii) Write two main requirements for matched filter.

(xiv) Amplitude limiting is present in Ratio detector.   TRUE or FALSE.

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