Instructions :   (1) ***All*** questions are ***compulsory***.
(2) Answer ***each*** next main question on a ***new*** page.
(3) Illustrate your answers with neat sketches ***wherever*** necessary.
(4) Figures to the ***right*** indicate ***full*** marks

Marks

1. Attempt **any five** :   **(2×5=10)**

   a) Define the term electrical noise. List types of noises.

   b) State formula to calculate bandwidth of AM signal.

   c) State the need of modulation in communication system.

   d) List different methods of demodulation of FM signal.

   e) Sketch the graph of pre-emphasis and de-emphasis.

   f) Sketch neat diagram of duet propagation.

   g) Draw sketch of half wave dipole antenna and its radiation pattern.

2. Attempt **any 3** :   **(3×4=12)**

   a) State the frequency range for the following :
       i) Voice frequency
       ii) High frequency
       iii) IR frequency
       iv) Visible frequency.

   b) Draw neat block diagram of FM receiver and explain function of each block.

   c) Compare AM with FM with respect to following points :
       a) Definition.
       b) Modulation index.
       c) Bandwidth.
       d) Side band.

   d) A superheterodyne radio receiver with an IF of 455 kHz is tuned to 1000 kHz. Find :
       a) Image frequency.
       b) Local oscillator frequency.

3. Attempt **any three** :

a) Draw AM signal in :

  i) Time domain

  ii) Frequency domain.

b) Find out type of propagation for following applications :

  1) AM radio broadcasting.

  2) Ship to shore propagation.

  3) Microwave links.

  4) Satellite communication.

c) Compare characteristics of asynchronous and synchronous transmission mode (four points).

d) Explain simple AGC and delayed AGC with the help of neat graph.

4. Attempt **any 3** :   **(4×3=12)**

a) Define the following terms :

  1) Virtual height

  2) Actual height

  3) Critical frequency.

  4) Maximum usable frequency.

b) Compare narrowband FM with wide band FM (four points).

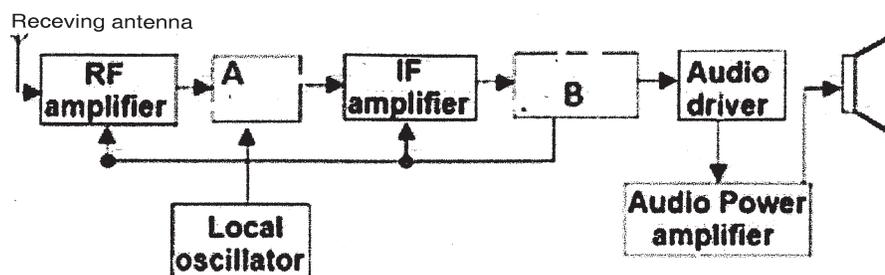c) Redraw the block diagram by identifying the blank blocks. Explain the role of blocks A and B. .

Figure 1

d) Justify electromagnetic wave is said to be transverse wave.

e) Sketch of Yagi-Uda antenna with its radiation pattern. Explain each element of Yagi-Uda antenna.

Marks

5. Solve **any two** : **(6×2=12)**

a) Explain ionospheric propagation with neat sketch. Explain two properties of layers of ionosphere.

b) i) State the significance of modulation index in AM transmission.

ii) Explain the effect of modulation index on AM wave with waveforms.

c) Write the application of the following antennas :
   1) Rectangular antenna
   2) Dish antenna
   3) Horn antenna
   4) Loop antenna
   5) Yagi-Uda antenna.

6. Solve **any 2** : **(2×6=12)**

a) Describe operating principle of dish antenna. Draw its constructional details and radiation pattern.

b) i) Explain electromagnetic spectrum with neat diagram.

ii) Explain atmospheric noise with example.

c) A 10 kw carrier is amplitude modulated by two sine waves to a depth of 0.5 and 0.6 respectively. Calculate total power of modulated wave.

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