

**DEPT. OF ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**GOVERNMENT POLYTECHNIC, BALASORE**  
**QUESTION BANK**  
**ON**  
**TH4- WAVE PROPAGATION & BROADBAND COMMUNICATION**  
**SEMESTER & BRANCH : – 5<sup>TH</sup> SEM, E & TC ENGINEERING**

**2 MARKS QUESTIONS**

1. Define the term power density
2. Why does the atmosphere absorb some power from waves propagating through it?
3. What is refraction? Explain under what circumstances it occurs and what causes it.
4. What is interference of radio waves?
5. Calculate the critical frequency of an ionospheric layer having electron density of  $4 \times 10^{12}$  electrons/m<sup>3</sup>.
6. Define the term critical frequency & maximum usable frequency.
7. Define skip distance .
8. What is fading? List its major causes.
9. Calculate the maximum line of sight distance covered by direct space wave if the height of transmitting and receiving antenna is given by 225 m and 16 m respectively above the ground level.
10. What is radio horizon ? How does it differ from the optical horizon?
11. Define the term effective radiated power and radiation resistance.
12. Define the term antenna beam width
13. Define the term antenna polarization
14. Define the radiation resistance of an antenna. What is the significance of this quantity.
15. What is horn Antenna? How is it fed?
16. Define the term skin effect.
17. Differentiate between the concepts of group velocity and phase velocity as applied to wave guides.
18. Discuss the advantages of circular wave guide.
19. What are cavity resonators? What application do they have?
20. What are the three main limitation of ferrites.
21. Define isolator and mention its application.
22. Describe the transit time effect in microwave frequencies.
23. Mention the two application of klystron?
24. Discuss briefly the three methods of beam focusing in TWTs.
25. What are gunn domain? How are they formed.
26. What is transmission line? Give two examples?
27. When coaxial cable is preferred over parallel-line?
28. Define characteristic impedance of transmission line.
29. Write the expression for characteristic impedance and its simplified form for RF frequencies.
30. Define the term standing wave ratio.
31. Define LOS propagation.
32. What is a Dipole antenna?
33. Draw an equivalent circuit of a transmission line indicating R, L, C, G.
34. Define stub.
35. Define TE and TM mode?
36. What is Aspect Ratio?

37. How EM waves are propagated through wave guide?
38. State the function of driven element.
39. What is attenuation of radio wave?
40. Write down the advantages of parabolic antenna.
41. Define beam width and polarization.
42. Define Standing wave Ratio.
43. What is sky wave? Which frequency band is used for Sky wave propagation?
44. What is duct propagation? Explain in brief.
45. Draw the RF equivalent circuit of a Transmission line.
46. Define the term maximum usable frequency.
47. Define the terms “skip distance” and “skip zone”.
48. What is actual height and virtual height?
49. What do you mean by smart antenna?
50. What do you mean by Aspect Ratio & Flicker?
51. Define SONET & ISDN?
52. Define hue, luminance & saturation?
53. State the relation between standing wave ratio and reflection coefficient?
54. What is Resolution? Name the types of Resolution.
55. What is a Stub? What do you mean by single stub matching?
56. Define absorption and attenuation of EM Wave.
57. Describe propagation of wave.
58. Define Bandwidth and Beam width of an Antenna.
59. Define SWR and VSWR.
60. Define Broadband Communication system.
61. What is Isolator? For what purpose it is used?
62. State two disadvantages of Rhombic antenna
63. Name two antennas which are Omni-directional in nature.
64. What is impedance matching?
65. Write down the advantages of Rhombic Antenna.
66. What is a transmission line? Where are the parallel wire lines and unbalanced lines used?
67. What is waveguide?
68. What are the different losses in transmission line?
69. What is directional coupler?
70. Write any two application of travelling waveguide.
71. Write the application of Tunnel diode.
72. Define the gain of an antenna.
73. What are the factors affects the directional pattern of an antenna?
74. What is waveguide and name the various types of waveguide.
75. Name two antennas which are used for microwave communication.
76. Write the application of Tunnel diode.
77. Mention the primary colours in a colour TV signal.
78. Define polarization and radiation resistance of an antenna.
79. Draw the V-I charecteristics and show the regions of operation of Gunn diode.
80. Draw a neat diagram of Directional Coupler and name its ports.

## **5 MARKS QUESTIONS**

1. Discuss the types of losses that may occur with RF transmission line. In what units are these losses normally given
2. With a sketch explain the difference between standing wave and traveling waves. Explain how standing wave occur in an imperfectly matched transmission line.
3. Define and explain the meaning of the term standing wave ratio. What is the formula for it if the load is purely resistive? Why is a high value of SWR often undesirable.
4. A transmission line has a characteristic impedance of  $500\ \Omega$ . It has been terminated in a  $200\ \Omega$  load. Calculate the following i) Reflection coefficient ii) VSWR on the line.
5. Briefly describe the following terms connected with sky wave propagation: Virtual height, critical frequency, maximum usable frequency, skip distance and fading.
6. What is ionosphere? Show how the electron density in the ionosphere varies with height. What frequency band used for ionospheric propagation.
7. Differentiate between sky wave and space wave propagation
8. Explain the construction & working of parabolic dish antenna with its advantages, disadvantages & applications
9. A certain antenna with an efficiency of 95% has maximum gain is 3. Calculate the maximum directivity of antenna in dB.
10. Derive the relation between standing wave ratio and reflection coefficient. Given that standing wave ratio is 3, calculate reflection coefficient of transmission line at load
11. A lossless air line has a characteristic impedance of  $70\ \Omega$  and a phase constant of 3 rad/met at 100MHz. Calculate the inductance per meter and capacitance per met of the line
12. Derive the expression for characteristic impedance & propagation constant for distortion less transmission line.
13. Draw the RF equivalent circuit of transmission line. What are the losses occurs in transmission line explain in details
14. Draw the block diagram of a monochrome television receiver and explain the functions of all the blocks.
15. Explain what is meant by the Y, I and Q signals in color TV and why are they generated.
16. Compare waveguides and transmission lines from the point of view of Frequency limitations, attenuation, spurious radiation and power handling capacity
17. A waveguide has an internal width of 3cm and carries the dominant mode of a signal of unknown frequency. If the characteristic wave impedance is  $500\ \Omega$ , what is this frequency
18. With the aid of a diagram explain fully the operation of directional coupler; also state its uses.
19. Describe the two cavity klystron amplifier with the aid of a schematic diagram which shows the essential components of this tube as well as the voltages applied to the electrodes.
20. What is slow wave structure? Why does TWT need such a structure and also explain the operation of TWT.
21. With the aid of suitable diagram explain ISDN. Write down its application
22. Explain the operation of horizontal and vertical scanning process.
23. Describe the function of the chroma stages in a TV receiver.
24. Describe the double stub matcher, the procedure used for matching with it
25. The directivity of two hole directional coupler is given by 20 dB. Calculate the forward power measured by the detector if reverse power is 200mW.
26. What is meant by the diffraction of radio waves? Under what condition does it arise?
27. Discuss the principle of operation of two cavity klystron amplifier with a neat circuit diagram.

28. Explain the operation of dish antenna with parabolic reflector.
29. What is the function of a directional coupler?
30. Explain the different types of losses in transmission line.
31. Discuss the principle of isolator and circulator.
32. Explain the operation of cavity resonator.
33. State and explain antenna gain, directive gain, directivity and efficiency of antenna
34. Discuss the effects of environments relating to diffraction, absorption & attenuation of EM waves.
35. Discuss the primary constant of X-mission line.
36. Explain the space wave propagation.
37. Discuss briefly about the characteristic impedance.
38. Discuss isolator with neat diagram.
39. Explain the transmission and reception process of a Horn Antenna.
40. State Short note on SONET & ISDN
41. Explain critical Frequency, Maximum Useable frequency, Skip distance and Fading.
42. What makes ISDN signaling flexible? Why is it that a packet switched network is more suitable than a circuit switched network for ISDN signaling?
43. Explain the phenomenon of selective fading in connection with tropospheric waves.
44. Discuss the principle of operation of LCD display.
45. What is ionosphere? Show how the electron density in the ionosphere varies with height.
46. What do you mean by Interlaced Scanning? How is it accomplished?
47. Discuss in brief the Yagi Uda antenna with neat diagram.
48. Discuss the working of a Travelling wave tube (TWT)?
49. Explain the Interlaced scanning?
50. Explain the operation of rectangular waveguide.
51. Explain the operation of omni directional antenna
52. Explain briefly about various broadband network architectures.
53. Explain the operations of dipole antenna
54. Explain about working of smart antenna and its advantages
55. Comparison the different Types of Televisions by Technology
56. Explain about CATV systems & Types & networks.
57. Explain about Digital TV Technology
58. Explain about Ground wave and Sky wave propagation

## **10 MARKS QUESTIONS**

1. Describe Ground wave propagation. What is the angle of tilt? How does it affect field strength at a distance from the transmitter
2. Briefly describe the following terms connected with sky-wave propagation: virtual height, critical frequency, maximum usable frequency , skip distance and fading.
3. With the aid of appropriate sketches explain fully the operation and construction of yagi-uda array. List its application. Why is it called a super gain antenna.
4. With the aid of suitable diagram describe the construction , feeding method of parabolic reflector antenna. What are its advantages and disadvantages.
5. Explain how bunching takes place in the klystron amplifier. Make a clear distinction between velocity modulation and current modulation.
6. Explain the operation of the reflex klystron oscillator. Why is the transit time so important in this device. List and discuss the application and limitation of reflex klystron oscillator.
7. Explain fully the gunn effect , where by negative resistance and therefore oscillation. Why are gunn devices are called diode.
8. A quarter wave transformer is connected directly to a  $50\Omega$  load to match this load to a transmission line whose  $Z_0=75\Omega$ . What must be the characteristic impedance of the matching transformer.  
ii) Explain fully the concept of impedance inversion by a quarter wave line.
9. Draw the block diagram of a color TV receiver, and explain each block.
10. Draw the block diagram of monochrome TV transmitter and explain function and operation of all the blocks.
11. Explain the effects of environment on propagation of waves, particularly reflections, refraction, interference and diffraction.
12. Explain the operation of rectangular waveguide and write its advantages and disadvantages.
13. Derive the equation for primary and secondary constant of transmission line.
14. Explain the operation of parabolic reflector with advantages & disadvantages
15. Discuss the principle of directional coupler and circulator.
16. Explain the radiation mechanism of an antenna.
17. Write short notes on any TWO
  - (i) Interlaced Scanning
  - (ii) Isolator
  - (iii) Impedance matching in transmission line
18. Describe the operation of Yagi-uda antenna and write its advantages and disadvantages.
19. With a neat sketch discuss the operation of horn antenna.
20. Explain SONET with its advantages and application.
21. Write the short notes on any two of the following with necessary diagrams
  - (i) Rectangular Waveguide
  - (ii) SONET
  - (iii) LCD
  - (iv) ISDN
22. State and explain antenna gain, directive gain, directivity and efficiency of antenna.
23. Discuss the detail the principle of operation of Cyclotron

24. Explain in brief the following terms with reference to colour television transmission and reception:
- (i) Luminance and Luminance signal
  - (ii) Chrominance and chrominance signal
  - (iii) Primary colour and secondary colour
25. Explain briefly the operation of directional coupler. Discuss the detail about the construction operation advantages and disadvantages of parabolic antenna
26. Write a detailed explanation on rectangular scanning and interlaced scanning.
27. Describe the propagation of wave through rectangular and circular waveguide in TE & TM modes.
28. State impedance matching in transmission line. Explain briefly double stub match lines.
29. Explain about operations of Tunnel diode and PIN diode.
30. Explain the working of different types of antenna.
31. Explain the operation of rectangular waveguide with its advantages.
32. Describe the construction, working operation and application of Gunn diode. What is Gunn Effect?
33. Discuss the different types of losses in RF transmission lines. To what extent it is justifiable to assume RF transmission lines to be loss-less.
34. Explain the operations of Mono pole and dipole antenna
35. Explain about Ground wave, Ionosphere ,Sky wave propagation, Space wave propagation