B.Tech III Year 5th Semester

Year(2022)

Branch ECE

Subject : Microelectronics **Class test : Final exam**

Time : 3Hour **M.M : 120**

Note : Attempt All question

1: (a) Answer the following questions (very short answer): (5x2=10)

(i) Write two basic functions of an antenna.
(ii) Define an antenna array.
(iii) Define Marconi antenna.
(iv) Define critical frequency.
(v) Define Gain of an antenna.

2: Answer the following questions (short answer): (5x4=20)

(a) Define isotopic antenna. Also establish a relation between electric field intensity and total radiated power for isotropic antenna.
(b) Write five controls that overall radiation pattern of an antenna array.
(c) Write five advantage and five applications of microstrip antenna.
(d) Find the range of space wave propagation.
(e) Calculate the effective aperture A_e for a dipole antenna 2cm at a frequency of 1.2GHz. what will be the power received for an incident power density of $2mW/m^2$.

3: Part(a) is compulsory and attempts any one of part (b) or part (c):

(a) Derive the relations between the effective area and gain of antenna.(6)
(b) Derive the expression for the field component and power radiated by an oscillating dipole. (12)
(c) Find the effective aperture of a short dipole and a liner $\lambda/2$ antenna.

4: Part(a) is compulsory and attempts any one of part (b) or part (c):

(a) Explain the array of two point sources with equal amplitude and phase. (6)

(b) Discuss the radiation pattern of a linear array of the isotropic source spaced $\lambda/2$ apart. The excitations of the sources are in-phase and have amplitude ratio 1:2:1. (12)

(c) Design a four element broadside array of $\lambda/2$ spacing between elements. The pattern is to be optimum with side lobe-level 18dB down the main lobe maximum. (12)

5: Part(a) is compulsory and attempts any one of part (b) or part (c):

(a) Explain the working and design of Yagi-Uda antenna.(6)

(b) Define working and characteristics of horn antenna. Calculate the beam width between first null of a 5m paraboloid refector used at 10 GHz. What will be its gain in dB. (12)

(c) Describe the principle of operation of rhombic antenna. Design a log-periodic antenna for the FM broadcast band using a ratio factor 0.95 and distance equal to 0.08 λ antenna.

6: Part(a) is compulsory and attempts any one of part (b) or part (c):

(a) A transmitter radiates 35 watt of power at a wavelength of 6cm. Calculate the power received by an antenna at distance of 150km if the gains of the transmitting and receiving antennas are equal and has a value of 40dB. (6)

(b) Derive an expression for field strength of space wave propagation. Also explain the effect of Earth's imperfection on space wave propagation . (12)

(c) In the ionosphere propagation, consider that the reflection take place at a height of 300km and the maximum density of the ionosphere corresponds to a refractive index of 0.8 at a frequency of 15 MHz. Determine the ground range for which this frequency is the MUF. Take the earth's curvature into consideration.

3: Part(a) is compulsory and attempts any one of part (b) or part (c):

(a) Write six drawbacks of the antenna measurments. (6)

(b) With help of suitable diagram explain the measurements. (12)

(c) Explain briefly explain two procedures used for radiation pattern measurement.