

## III B. Tech I Semester Supplementary Examinations, October/November - 2020

**ANTENNA AND WAVE PROPAGATION**

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
 2. Answer **ALL** the question in **Part-A**  
 3. Answer any **FOUR** Questions from **Part-B**
- ~~~~~

**PART -A****(14 Marks)**

1. a) Define radiation intensity of an antenna. [2M]
- b) Obtain the directivity of an Isotropic antenna. [2M]
- c) Write weights of 5 elements binomial array. [2M]
- d) Explain the significance of Long length antennas. [3M]
- e) Differentiate between wire grid reflectors and corner reflectors. [3M]
- f) Write short notes on M curves. [2M]

**PART -B****(56 Marks)**

2. a) Define the term  $I_{eff}$  of an antenna. Show that the  $I_{eff}$  of an antenna used in a transmitting mode is the same as that of the  $I_{eff}$  used in receiving mode. [7M]
- b) Define and derive the effective height  $h_{eff}$  of an antenna. Find ' $h_{eff}$ ' of a short dipole and  $\lambda/2$  antenna. [7M]
3. a) What are the main characteristics of a radiated wave in far field region? The components of a wave in far field region are  $E_{\theta}=3mV/m$  and  $E_{\phi}=4mV/m$ . Calculate the total electric and magnetic field in free space. [7M]
- b) What is short magnetic dipole and explain how it can be realized? [7M]
4. a) An array consists of two collinear  $\lambda/2$  dipoles with  $\lambda$  spacing. Determine gain and beam width of the major lobe between 3dB points in the plane containing the array. [7M]
- b) Explain the significance and characteristics of an EFA with increased directivity. [7M]
5. a) Describe the characteristics of long wire travelling wave antennas and sketch their patterns. [4M]
- b) Explain the working principle of helical antenna in various modes. [10M]
6. a) Establish and explain the gain and beamwidth relations for a parabolic reflector and account for its beam shaping considerations in terms of F/D and losses. [7M]
- b) Distinguish between sectoral, pyramidal and conical horns, with neat sketches. List out their utility and applications. [7M]
7. a) Establish the mathematical relations for: i) radio horizon, and ii) Field strength at receiver. [10M]
- b) Explain the principle of operation of troposcatter of communication. [4M]

\*\*\*\*\*