

**GANPAT UNIVERSITY**  
**B. Tech. Semester VI (EC)**  
**CBCS Regular Examination April-June 2017**  
**2EC601: Antenna Engineering and Wave Propagation**

Time: 3 Hours]

[Total Marks: 60

**Instructions:**

1. Attempt all questions.
2. Answers to the two sections must be written in separate answer books.
3. Figures to the right indicate full marks.
4. Assume suitable data, if necessary.

**SECTION-I**

- Q:1** (A) Derive the expression of antenna transmission Loss. (FRIIS formula) 5  
 (B) In a microwave communication link, two identical antennas operating at 10 GHz are used with power gain of 40 dB. If the transmitter power is 1W, find the received power, if the range of the link is 30 km. 5

**OR**

- Q:1** (A) Explain each antenna elements using their definitions. 5  
 (B) A 2.7 meter diameter parabolic reflector is used in terrestrial low link at 7.375 GHz. Calculate the gain and beam width of the antenna. 5
- Q:2** (A) What will be the effect of Earth on vertical patterns? Explain. 5  
 (B) Find the basic and actual transmission losses between two antennas separated by 30 m, operating at 10 MHz, when the gain of each antenna is 1.65 dB. 5

**OR**

- Q:2** (A) Define Antenna Impedance? Explain different impedance matching techniques. 5  
 (B) An antenna has an effective length of 100 meters and current at the base is 450 amperes (rms) at 40000 Hz. What is the power radiated? If the total resistance of the antenna circuit is 1.12 ohms, what is the efficiency of the antenna? 5
- Q:3** (A) Derive the expression of the radiation resistance of Hertzian Dipole. 5  
 (B) List and explain any five antenna parameters. 5

## SECTION-II

- Q:4 (A) Derive the equation of electric field for two point sources with equal magnitude and opposite phase; also draw the radiation pattern for it. 5  
(B) Design a five element broadside array, which has a maximum pattern for a side lobe level of 20 db. The spacing between elements has to be  $\lambda/2$ . 5
- OR
- Q:4 (A) Explain the necessary steps for design of Dolph-Tschebysheff (DT) Array. 5  
(B) What is Polarization? Explain the circular polarization. 5
- Q:5 (A) Derive the equation for the Radiation resistance ( $R_r$ ) for Circular Loop antenna. 5  
(B) Differentiate the Resonant and Non-Resonant antenna. 5
- OR
- Q:5 (A) Explain the Yagi- Uda antenna in detail. 5  
(B) Explain the horn and slot antenna. 5
- Q:6 (A) What is antenna array? Explain the broadside and end-fire array. 5  
(B) Write short note on Helical antenna. 5

**END OF PAPER**