

Roll No.:.....

**National Institute of Technology, Hamirpur (HP)**

**Name of Examination: M. Tech. End Semester Examination (December -2020)**

Branch: **Electronics & Communication Engineering**

Semester: **1<sup>st</sup>**

Title of the Course: **Advanced Antenna Design**

Course Code: **EC-704**

Time: **120 Minutes**

Maximum Marks: **50**

Note:

1. All the questions are compulsory.
2. The Marks of each question are indicated against the question.

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- Q. 1.** A telemetry transmitter on a moon has a transfer data to earth, total power = 100mW. The gain of the transmitting antenna in the direction of transmission is 12dB. Find the minimum gain receiving antenna required in order to receive 1 nW power if the transmitter frequency is 100 MHz. **[4 Mark]**
- Q. 2.** Define Radiation pattern and draw the pattern for (a) half wave antenna (b) full wave antenna (c)  $3\lambda$  wavelength antenna and (d)  $3\lambda / 2$  wavelength antenna. **[4 Mark]**
- Q. 3.** With suitable diagram discuss the radiation mechanism of microstrip patch antenna. **[4 Mark]**
- Q. 4.** Discuss different feeding mechanism in microstrip antenna. **[4 Mark]**
- Q. 5.** Design a circular microstrip antenna using a substrate (Fire Retardant-4) with a dielectric constant of 4.4,  $h = 1.6$  mm, with resonant frequency at 10 GHz. **[4 Mark]**
- Q. 6.** Discuss the concept of circular polarization in short. **[4 Mark]**
- Q. 7.** Discuss the Smart Antenna concept with human analogy and explain its transmitter and receiver block diagram in details. **[5 Mark]**
- Q. 8.** Discuss Babinet Principle in details. **[4 Mark]**
- Q. 9.** An *E*-plane horn is fed by an *X*-band WR 90 rectangular waveguide with inner dimensions of 0.9 in. (2.286 cm) and  $b = 0.4$  in. (1.016 cm). Design the horn so that its maximum directivity at  $f = 11$  GHz is 30 (14.77 dB). **[4 Mark]**
- Q. 10.** Discuss the radiation mechanism of wire antenna. **[4 Mark]**
- Q. 11.** Discuss the concept of Binomial Array with its disadvantages. **[4 Mark]**
- Q. 12.** Discuss the concept of Array with of two Isotropic point source (a) Equal Amplitude and Phase (b) Equal Amplitude and Opposite Phase (c) Unequal Amplitude any opposite phase **[5 Mark]**