Question Paper Code:U1202

M.E. DEGREE EXAMINATION, APRIL 2024

First Semester

Communication Systems

21PCM102 - ANTENNAS AND RADIATING SYSTEMS

(Regulations 2021)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART - A (5 x 20 = 100 Marks)

1. (a) (i) Two spacecrafts are separated by 100 Mm. Each has an antenna CO2–App (15)
         with D = 1000 operating at 2.5GHz. If craft A receiver requires 20
         dB over 1 pW, what transmitter power is required on craft B to
         achieve this signal level?

         (ii) Explain about Half power Beam width.   CO1–U   (5)

                                      Or

    (b) (i) In microwave communication link, two identical antennas   CO2–App (15)
         operating at 10GHz 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 30km. Calculate the Radiation resistance of a current
         element whose overall length is $\lambda/50$.

         (ii)Illustrate in detail about Directivity of a dipole.   CO1–U   (5)

2. (a) Estimate the diameter and the effective aperture of paraboloidal CO3–App (20)
         reflector antenna required to produce a null beam width of 10^0 at
         3GHz.

                                      Or

    (b) Derive the impedance of an infinitesimally thin $\lambda/2$ slot antenna by CO3- App (20)
         applying radiation mechanism of slot antenna.

3. (a) Design an antenna for a radio receiver operating at the frequency   CO4- App   (20)
range of 3GHz to 300GHz

<div align="center">Or</div>

   (b) An array operating at 100cm wavelength consists of four half   CO4- App   (20)
wave dipoles spaced 50cm.Each element carries RF current in the
same phase and of magnitude 0.5amp. Calculate
(i) Power radiated
(ii) Half power beam width of major lobe.

4. (a) Design a Microstrip rectangular Antenna that operates at 2.4GHz   CO5–Ana   (20)
and 5.1 GHz and design the same for the given specifications and
infer the results: (Height : 1.6 mm Metal Thickness: 0.7 mil ε_r : 4.6
Assume other necessary data).

<div align="center">Or</div>

   (b) Design a Microstrip Antenna for medical applications and   CO5–Ana   (20)
simulate the same for the given   specifications: (Height: 1.6 mm
Metal Thickness: 0.7 mil ε_r: 4.6 Assume other necessary data)

5. (a) Illustrate the construction and principle of operation of Log-   CO1-U   (20)
periodic Antenna.

<div align="center">Or</div>

   (b) Explain in detail about the various procedure to measure the gain   CO1-U   (20)
and radiation pattern of an antenna.

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