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B. Tech
PEEC 5401

Seventh Semester Examination – 2008

ANTENNA ENGINEERING

Full Marks – 70

Time – 3 Hours

*Answer Question No. 1 which is compulsory
and any **five** from the rest.*

*The figures in the right-hand margin
indicate marks.*

1. Justify : 2×10
- (a) Isotropic radiator radiates equally in all directions.
 - (b) Standing waves are present along half wave dipole.
 - (c) If the feed point of the antenna is at a current maximum, the input impedance is only real.

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- (d) Substitution method of antenna measurement is better than the bridge method.
- (e) Antenna polarization can be easily obtained by received power measurement.
- (f) Cassegrain feed mechanism is very popular for low noise applications.
- (g) The efficiency of a corrugated horn is more than that of conventional horn.
- (h) Horn is a flared out waveguide.
- (i) The desired polarization can be obtained by different shapes of the microstrip antenna.
- (j) The method of moment is useful for finding field distribution in slots and other wire antennas.
2. (a) Explain the following : 6
- (i) Method of excitation of antennas
- (ii) Impedance matching techniques.

- (b) An array of dipoles of $\frac{\lambda}{2}$ length in end-fire mode is to produce a power gain of 24. Find (i) array length, number of elements when spaced $\frac{\lambda}{2}$ and (ii) Null to Null beam width. 4

3. What is a log-periodic antenna ? What are the salient features of such antenna ? Draw a log-periodic array and write the equations involve in designing the same. 10
4. (a) Enumerate the salient features of resonant antennas. How these are different from travelling wave antenna ? 5
- (b) A rhombic antenna is to operate at a frequency of 45 MHz with the elevation angle 35° with respect to ground. Find (i) height of the rhombic, (ii) tilt angle, and (iii) length of each wire. 5

5. Explain the following in relation with a patch antenna : 2.5×4

- (a) Patch parameters
- (b) Methods of bandwidth control
- (c) Shapes of antenna
- (d) Characteristic impedance.

6. (a) Explain the radiation phenomena of a waveguide slot. 4

(b) The aperture dimensions of a pyramidal horn are 10×5 cm. It is operating at 6.6 GHz. Find (i) beam width, (ii) power gain and (iii) directivity. 6

7. (a) Why antenna measurements are necessary ? What are the drawbacks in measurements of antenna parameters? 4

(b) Explain impedance measurement by Wheatstone bridge method. 6