

C

Reg. No. :

--	--	--	--	--	--	--	--	--	--

**Question Paper Code: 56402**

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2021

Sixth Semester

Electronics and Communication Engineering

15UEC602–ANTENNA AND WAVE PROPAGATION

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

- Directivity from pattern is CO1- R  
(a) WA (b)  $4p/WA$  (c)  $P(q,f)_{max}/P(q,f)_{av}$  (d) None of above
- The radiation resistance of a circular loop of one turn is  $0.01\Omega$ . The radiation resistance of five turns of such a loop will be CO2- R  
(a)  $0.002\Omega$  (b)  $0.05\Omega$  (c)  $0.01\Omega$  (d)  $0.25\Omega$
- Which antenna is the complementary to the slot antenna? CO3- R  
(a) biconical (b) helical (c) dipole (d) Lens
- How do the elements of an active region behave in log periodic antenna CO4- R  
(a) Capacitive (b) Inductive (c) Resistive (d) Reflective
- The signal propagates above 30MHZ is named as CO5- R  
(a) Sky wave propagation (b) Space wave propagation  
(c) Ground wave propagation (d) None

PART – B (5 x 3= 15 Marks)

- Calculate the radiation intensity of an antenna which radiates the power of 20 watts and has directivity of 100 CO1- U
- Calculate the efficiency of a dipole with a radiation resistance of  $68\Omega$  and a total feed point resistance of  $75\Omega$ . CO2- App
- List out the advantages and disadvantages of lens antenna. CO3- U
- Draw the structure of 3 element yagi uda antenna and give the dimensions and spacing between elements in terms of wavelength. CO4- R
- Define virtual height and MUF CO5- App

PART – C (5 x 16= 80Marks)

11. (a) (i) An antenna has a radiation resistance of  $72\Omega$  loss resistance of  $8f\Omega$  power gain of 12dB. Determine the antenna efficiency and directivity. CO1- App (8)
- (ii) An antenna radiates a total power of 100W in the direction of maximum radiation, the field strength at a distance of 10Km was found to be 12mV/m. What is the gain of the antenna? Assume free space propagation. If  $\eta=90\%$  find directivity. CO1- App (8)
- Or
- (b) Write short notes on CO1- U (16)
- (a) Half Power beam width,
- (b) Polarization,
- (c) Directivity,
- (d) Principal patterns.
12. (a) Derive the expression for field components and radiation resistance of Hertzian dipole CO2- App (16)
- Or
- (b) Find the direction of pattern maxima and pattern minima for an array of n sources with equal amplitude and spacing in broadside case CO2- App (16)
13. (a) Explain the types of reflector antenna and working principle of parabolic reflector antenna in detail CO3- U (16)
- Or
- (b) (i) A pyramidal horn with aperture length of  $10\lambda$  cm is fed by a rectangular waveguide in  $TE_{10}$  mode. Determine the design parameters of the antenna operating at 2.5GHz. CO3- U (10)
- (ii) Discuss in detail about radiation mechanism of slot antenna. CO3- U (6)
14. (a) (i) Describe the modes of operation of helical antenna with design equations. CO4- U (10)
- (ii) Explain the procedure for the measurement of gain. CO4- U (6)
- Or
- (b) Explain the techniques used for Radiation pattern and ranges of antenna measurement. CO4- App (16)
15. (a) (i) Derive an expression for refractive index of ionosphere. CO5- U (10)
- (ii) Explain Tropo scatter propagation. CO5- U (6)

Or

- |   |        |     |
|---|--------|-----|
| (b) Write short notes on                                      | CO5- U | (8) |
| (i) Explain the important features of ground wave propagation |        |     |
| (ii) Duct propagation   | CO5- U | (4) |
| (iii) Optimum working frequency                               | CO5- U | (4) |

