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Question Paper Code: 56402

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2023

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 0.01Ω . The radiation resistance of five turns of such a loop will be CO2- R
(a) 0.002Ω (b) 0.05Ω (c) 0.01Ω (d) 0.25Ω
- 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 68Ω and a total feed point resistance of 75Ω . 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 72Ω 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 10λ 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

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| (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) |

