



Printed Pages : 3

TEC - 605

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 3100

Roll No.

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B. Tech.

(SEM. VI) EXAMINATION, 2008-09 ANTENNA AND WAVE PROPAGATION

Time : 3 Hours]

[Total Marks : 100

Note : Attempt all the questions.

1 Attempt any **two** questions of the following : $10 \times 2 = 20$

(a) Explain the following:

- (i) Isotropic Radiator
- (ii) Directive Gain
- (iii) Effective length

(b) Derive Reciprocity theorem for antennas. Show that the transmitting and receiving radiation pattern of antennas are equal.

(c) Explain the operation of a yagi-uda antenna. What are the advantages? Differentiate between the director and reflector of the antenna.

2 Attempt any **two** questions of the following : $10 \times 2 = 20$

(a) What is a broadside array? Explain in detail the structure, radiation pattern and principle of operation of such an antenna.



- (b) Find the location of the first nulls on either side of the beam centre for linear array of 80-in-phase elements fed with equal amplitude current which are $\frac{\lambda}{2}$ apart.
- (c) Explain the Non-resonant antenna (Rhombic antenna) and show its radiation pattern. Why it is called broadband antenna?

3 Attempt any **two** questions of the following : **10×2=20**

- (a) Write short notes on following :
- (i) Ground Wave Propagation
 - (ii) Duct propagation
 - (iii) Effect of ionosphere on sky waves.
- (b) What is the mechanism of tropospheric propagation? What are the practical considerations involved in using troposcatter propagation? What are the advantages of using this mechanism?
- (c) Discuss the effect of Earth's magnetic field on ionospheric radio wave propagation. Estimate the Gyro-frequency.

4 Attempt any **two** questions of the following : **10×2=20**

- (a) An air-filled rectangular waveguide has dimensions of $a = 6$ cm and $b = 4$ cm. The signal frequency is 3 GHz. Compute the following for TE_{10} mode.
- (i) Cut off frequency
 - (ii) Wavelength in waveguide
 - (iii) Phase velocity in waveguides
 - (iv) Wave impedance in waveguide.



- (b) Derive expression for field components for TE wave in rectangular waveguide. Define dominant and degenerate modes.
- (c) What do you understand by excitation of waveguides? What are the various methods of excitation of rectangular and circular waveguides?

5 Attempt any **two** questions of the following : **10×2=20**

- (a) What is velocity modulation? Explain the operation of reflex Klystron with neat diagram.
 - (b) Explain the schematic and working of magnetron.
 - (c) Write short notes on any **two** of the following :
 - (i) TWT amplifier
 - (ii) Gunn diode
 - (iii) Backward Wave Oscillator (BWO)
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