Roll No. | | | | | | | | | | | | |

Total No. of Questions: 09 **Total No. of Pages: 02**

B. Tech. (Electronics Engg./ECE/ETE) (Sem. 4)

ELECTROMAGNETICS & ANTENNAS

Subject Code: BTEC-403

Paper ID: A1191

Time: 03 Hrs. **Max. Marks: 60**

INSTRUCTIONS TO CANDIDATES:

1. **Section A is COMPULSORY consisting of TEN questions carrying TWO marks each**
2. **Section B contains FIVE questions carrying FIVE marks each and students have to any FOUR questions.**
3. **Section C contains THREE questions carrying TEN marks each and students have attempt any TWO questions.**

SECTION A

1.

a) Prove that $E = -\nabla V$ Where E is electric field vector and V is Electric potential.

b) A lossless transmission line having characteristic impedance 400 ohm is terminated by a resistance of 200 ohm. Calculate VSWR of line.

c) Show that displacement current in a capacitor is equal to conduction current.

d) What is the difference between wave impedance and characteristic impedance?

e) What is difference between induction and radiation field. Calculate the distance at which these fields become equal in magnitude.

f) What is Retarded vector potential?

g) Define Skip distance.

h) What are reflector antennas?

i) What is difference between directive gain and directivity of antenna?

j) What is difference between antenna bandwidth and Beam width?

SECTION B

2. What is surface impedance? Evaluate the value of surface impedance if $\sigma = 5x10^5, \varepsilon_r = 15, \mu = \mu_0$ at

(a) 5KHz

(b) 50KHz and

(c) 500KHz.

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3. A microwave link is to be established over a distance of 30Km at 10 GHz by using two identical parabolic reflector antennas , each having a power gain of 40 (dB). The transmitting antenna radiates a power of 1 (W). Neglecting losses, find the power received, at the receiving antenna.

4. Derive the relationship between E and Hin case of uniform plane wave.

5. What is meant by Dolph-Cheyshev distribution for linear broadside array? Show that such distribution gives a minimum side lobe level for a given beam width of major lobe.

6. Calculate the cut-off frequencies for the $TE_{01,}$ TE_{11} and TM_{12} modes in rectangular metal wave guide 2cmX1cm.

SECTION C

7. Define radiation resistance of an antenna. Compute the instantaneous and average power flows associated with linearly polarized electric field component propagating in free space $E_x = 20\sin(wwwz/ c)$ and direction of power flow.

8. Derive an expression for radiation pattern of End fire, uniform linear array of 4- equally spaced isotropic antennas. Also calculate HPBW of its major lobe.

9. Write Short Note on Following

(a) Optimum working frequency
(b) Duct Propagation
(c) Multi-hop propagation
(d) Effect of earth's magnetic field

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