

TE SEM V (REV) (ETRX)

Electromagnetic Engg.

10/5/13

ws-Con-2013-1

Con. 7029-13.

GS-8745

(3 Hours)

[Total Marks : 100

N.B (1) Question no.1 is compulsory.

(2) Attempt any 4 questions from remaining questions.

(3) Vector notations should be used wherever necessary.

(4) Assume suitable data if necessary.

1. (a) Explain the concept of displacement current. 5
- (b) Derive Poisson's and Laplace's equations. 5
- (c) Derive wave equations for a conducting medium. 5
- (d) Explain the concept of retarded potentials. 5

2. (a) Derive Maxwell's equations for static field in integral and point form. 10
- (b) An electric field in a medium which is source free is given by 10

$E = 1.5 \cos(10^8 t - \beta z) \hat{a}_x$ V/m, where E_m is the amplitude of E, ω is the angular

Frequency and β is the phase constant. Obtain D, B, H. Assume $\epsilon_r = 1, \mu_r = 1$

3. (a) State and prove Poynting theorem. Explain the terms instantaneous, average and complex Poynting theorem. 10
- (b) Define polarization of a wave. Explain the types of polarization. 10

4. (a) Define input impedance of a transmission line. Derive expressions for short and open

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- Circuit impedance of a two wire transmission line. 10
- (b) A transmission line of length 0.40λ has a characteristic impedance of 100Ω and is terminated in a load impedance of $200+j180\Omega$. Find using smith chart 10
- (i) Voltage reflection coefficient
- (ii) Voltage standing wave ratio
- (iii) Input impedance of the line.
5. (a) Define uniform plane wave. Explain reflection of uniform plane wave at normal incidence. 10
- (b) Explain pulse broadcasting in dispersive media. 10
6. (a) Explain different sources of EMI. What is the need of electromagnetic compatibility? 10
- (b) Derive expression for expression for radiation fields of an alternating current element. 10
7. Write short notes on;
- (a) Smith chart
- (b) Ampere's law
- (c) Electrostatic discharge
- (d) Impedance matching techniques.
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