Registration No: | | | | | | | | | | |

Total Number of Pages: 02 **B.TECH**
PET4I101

4th Semester Regular / Back Examination 2017-18
ELECTROMAGNETICS ENGINEERING
BRANCH: ECE, ETC
Time: 3 Hours
Max Marks: 100
Q Code: C681

Answer Part-A which is compulsory and any four from Part-B.
The figures in the right hand margin indicate marks.
(The vectors are denoted asbold block letters, eg. '**A**'and unit vectors as'$\mathbf{a}_\Phi$')
Answer all parts of a question at a place.

Part – A (Answer all the questions)

Q1 Answer the following questions: ***Dash fill up type*** **(2 x 10)**

a) The intrinsic impedance of free space is _____.

b) At every point in space, $\mathbf{a}_\Phi . \mathbf{a}_\theta$= _____.

c) A coaxial line joins _____ side to load side.

d) The Poynting vector is represented as _____.

e) _____ theorem is also known as Gauss-Ostrogradsky theorem.

f) Transmission line and _____ are used for the propagation of guided waves.

g) The phase velocity of an electromagnetic wave in free space is _____.

h) At absolute zero some conductor exhibit infinite conductivity and are known as _____.

i) _____ is the matching condition for transmission lines with load.

j) _____ field varies periodically or sinusoidallywith time.

Q2 Answer the following questions: ***Short answer type*** **(2 x 10)**

a) Differentiate between conduction and convection current.

b) Illustrate with diagram the difference between positive and negative divergence.

c) Define TEM waves.

d) Show with how an **E** and **H** wave travels in air.

e) Draw a two-conductor transmission line showing the distributed parameters.

f) What are the ranges of the coordinate variables in a cylindrical coordinate system?

g) Define SWR.
h) Faraday's law and Lenz's law are same or different? Explain.
i) Under what condition a line is said to be lossless?
j) Write any four properties of the Curl.

Part – B (Answer any four questions)

Q3 **a)** Derive an expression for Electric Field Intensity of an infinite line charge. **(10)**

b) Define Farady's law. Obtain the expression for it. **(5)**

Q4 **a)** Find the solution of the one-dimensional wave equation. **(10)**

b) Explain the role of displacement current in obtaining the Maxwell's equations. **(5)**

Q5 **a)** Derive expressions for input impedance for lossless and lossy transmission line. **(10)**

b) Calculate the distance between: **(5)**
(i) (2,1,5) and (6,-1,2), (ii) (3,π/2,-1) and (5,3π/2,5).

Q6 **a)** Write down the initial and final forms of the Maxwell's equation in integral and differential forms. **(10)**

b) Explain how a wave behaves on oblique incidence at a surface. **(5)**

Q7 **a)** State and prove Stoke's theorem. **(10)**

b) Why α and β are known as attenuation and phase constants? Write the generalized equation for them. **(5)**

Q8 **a)** In a charge-free region for which $\sigma = 0$, $\epsilon = \epsilon_0 \epsilon_r$ and $\mu = \mu_0$, Magnetic field intensity is given by, $\mathbf{H} = 5 \cos (10^{11}t - 4y)\ \mathbf{a}_z$A/m. Find Electric Flux Density **D**. **(10)**

b) What are the key properties about the line parameters of a transmission line? **(5)**

Q9 **a)** What do you understand by boundary conditions and retarded potential? What is its significance in deriving Maxwell's equation? **(10)**

b) What is a Uniform Ideal Transmission Line? Write its properties. **(5)**