Code: DE107 Subject: **NETWORKS & TRANSMISSION LINES**

DipIETE – ET (New Scheme)

Time: 3 Hours | **December 2016** | **Max. Marks: 100**

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE: There are 9 Questions in all.

- **Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.**
- **The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.**
- **Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.**
- **Any required data not explicitly given, may be suitably assumed and stated.**

Q.1 **Choose the correct or the best alternative in the following:** **(2×10)**

a. Laplace Transform of the function e^{-2t} is _____.

  (A) $\dfrac{1}{s-2}$ **(B)** $s + 2$

  (C) $\dfrac{1}{s+2}$ **(D)** $2s$

b. The value of Z_O for open wire transmission line, in terms of S(spacing between two wires) and r (radius of either of wire) is _____.

  (A) $64\log_{10}\dfrac{S}{r}\,\Omega$ **(B)** $276\log_{10}\dfrac{S}{r}\,\Omega$

  (C) $76\log_{10}\dfrac{r}{S}\,\Omega$ **(D)** $275\log_{10}\dfrac{r}{S}\,\Omega$

c. Characteristic impedance in terms of Z_{OC} & Z_{SC} is _____.

  (A) $Z_O = \sqrt{Z_{OC}\cdot Z_{SC}}$ **(B)** $Z_O = \sqrt{\dfrac{Z_{OC}}{Z_{SC}}}$

  (C) $Z_O = \sqrt{\dfrac{Z_{SC}}{Z_{OC}}}$ **(D)** $Z_O = Z_{OC}\sqrt{Z_{SC}}$

d. The reflection factor of a transmission line in terms of source impedance Z_1 and load impedance Z_2 is

  (A) $\dfrac{4Z_1Z_2}{|Z_1+Z_2|}$ **(B)** $\dfrac{2|Z_1+Z_2|}{\sqrt{Z_1Z_2}}$

  (C) $\dfrac{2\sqrt{Z_1Z_2}}{|Z_1+Z_2|}$ **(D)** $\dfrac{4(Z_1/Z_2)}{|Z_1+Z_2|}$

e. VSWR in case of Ultra high frequency lines is _____.

(A) $\left| \dfrac{V_{max}}{V_{min}} \right|$ (B) $\left| V_{max} \cdot V_{min} \right|$

(C) 1   (D) None of these

f. The reciprocity theorem applies to only one of the following networks
(A) Bilateral networks only   (B) Linear as well as non-linear networks
(C) Only Non-linear networks   (D) Linear and bilateral networks

g. Condition for reciprocity in Z-Parameters is
(A) $Z_{11} = Z_{22}$ (B) $Z_{12} = Z_{21}$
(C) $Z_{11} = Z_{12}$ (D) $Z_{21} = Z_{22}$

h. An m-derived filter with m = 1 is same as _____
(A) Attenuator   (B) Prototype filter
(C) Equalizer   (D) None of these

i. Which of the following attenuators have minimum loss?
(A) T-attenuator   (B) L attenuator
(C) Ladder attenuator   (D) π-attenuator

j. In a series RLC circuit at resonance, one of the following equations is satisfied
(A) $\omega^2 LC = 1$ (B) $\omega LC = 1$
(C) $\omega L^2 C^2 = 1$ (D) $\omega^2 L^2 C^2 = 1$

Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.

Q.2 a. Explain wavelength & velocity of propagation.   **(4)**

b. Explain the loop resistance of an open wire line.   **(4)**

c. A telephone line has resistance of 20Ω, inductance of 10 mH, capacitance of 0.1 µF and insulation resistance of 0.1 mega ohm/km. Find the input impedance at angular frequency of 5000 radian/sec if the line is very long.   **(8)**

Q.3 a. Discuss in detail about the Input impedance of open and short circulated lines.   **(8)**

b. Discuss efficiency of Transmission.   **(4)**

c. Explain SWR of a line with any termination.   **(4)**

Q.4 a. Derive the relation between VSWR and reflection co-efficient for ultra high frequency lines.   **(8)**

b. Explain double stub matching with the help of diagram.   **(8)**

Q.5   a. With the help of a block diagram, explain about composite filter.   **(8)**

     b. Design an L-type attenuator to operate into a resistance of 500Ω and to provide an attenuation of 15 dBs.   **(8)**

Q.6   a. Find the value of voltage V_{AB} by applying superposition theorem to the network shown in Fig.1.   **(8)**
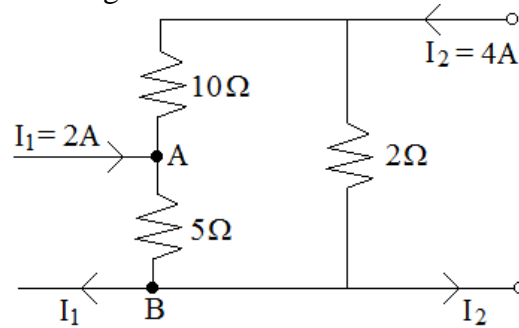

Fig.1

     b. Find the current in the 10Ω resistor by using Thevenin's theorem when it is connected to terminals ab as shown in Fig.2.   **(8)**
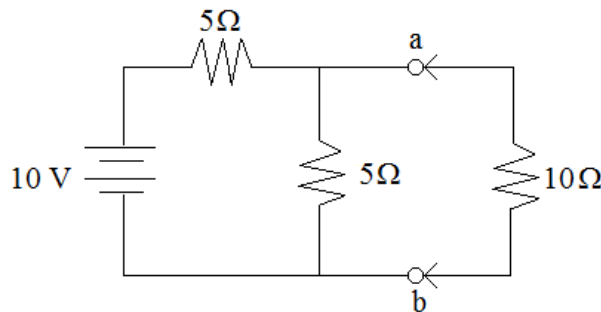

Fig.2

Q.7   a. Explain Laplace transform of unit impulse function.   **(8)**

     b. Discuss in detail the initial and final value theorem.   **(8)**

Q.8   a. Explain the characterization of a two port network in terms of ABCD parameters.   **(8)**

     b. A two port network has the following Z-parameters:
$Z_{11}=10Ω$, $Z_{22}=12Ω$, $Z_{21}=Z_{12}=5Ω$. Determine the y-parameters for the same network.   **(8)**

Q.9   a. Explain in detail about the resonance in parallel RLC circuit and derive an expression for resonant frequency.   **(8)**

     b. A coil with inductance and resistance of 5 mH and 10Ω respectively are connected in series with a capacitor and a 10V, 1kHz source.
Determine the
(i) value of capacitance that will cause resonance in the circuit
(ii) circuit current at resonance frequency   **(8)**