ROLL NO. _____

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

DipIETE – ET (New Scheme)

Time: 3 Hours **June 2019** **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. What should be location of poles corresponding to ROC for bilateral Inverse Laplace Transform especially for determining the nature of time domain signal?

(A) On L.H.S of ROC **(B)** On R.H.S of ROC
(C) On both sides of ROC **(D)** None of these

b. Which result is obtained by the addition of a step to a ramp function

(A) Step function shifted by an amount equal to ramp
(B) Ramp function shifted by an amount equal to step
(C) Ramp function of zero slop
(D) Step function with zero slop

c. Thevenin's voltage is equal to the _____ voltage across the ___ terminals.

(A) Short circuit, input **(B)** Short circuit, output
(C) Open circuit, output **(D)** Open circuit, input

d. According to Millman's Theorem, if there are n voltage sources with n internal resistances respectively, which are in parallel, then these sources are replaced by?

(A) Single current source I' in series with R'
(B) Single voltage source V' in series with R'
(C) Single current source I' in parallel to R'
(D) Single voltage source V' in parallel to R'

e. An electronic test circuit produces a resonant curve of half power frequency point at 414 Hz and 436 Hz. If Q factor be 10, the resonant frequency of circuit is

(A) 220 Hz **(B)** 2.2 Hz
(C) 0.454 Hz **(D)** 22 Hz

f. In a simple RC high pass filter the desired roll of frequency is 15 Hz and C =10μF, The value of R is

(A) 2.25KΩ **(B)** 1.06 KΩ
(C) 7.87 KΩ **(D)** 15.23 KΩ

g. When power cables are laid in proximity of communication cables, what is the minimum horizontal and vertical clearance for separation of these two cables?

(A) 1.0 m **(B)** 0.6 m
(C) 2.4 m **(D)** 4.0 m

h. When bundle conductor are used in place of single conductor, the effective inductor and capacitance will _____ respectively.

(A) Decrease and increase **(B)** Increase and decrease
(C) Increase and remain unchanged **(D)** Decrease and remain unchanged

i. The expression of bandwidth for series resonant circuit is?

(A) R/L **(B)** L/R
(C) LR **(D)** RLC

j. Shape of the resonance curve depends upon the?

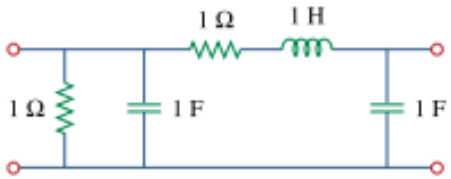
(A) Q-factor **(B)** Voltage
(C) Current **(D)** Either voltage or current

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

Q.2 a. Find the inverse Laplace transform of $\frac{s+1}{s^2+s+1}$. **(8)**

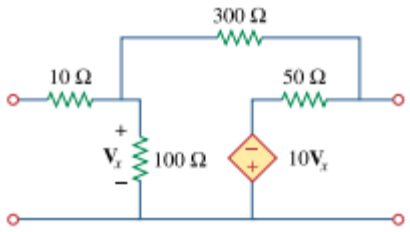
b. Find the time domain current *i(t)* if its Laplace transform is $I(s) = \frac{s-10}{s^4+S^2}$ **(8)**

Q.3 a. Obtain the z parameters for the network in given figure as functions of s



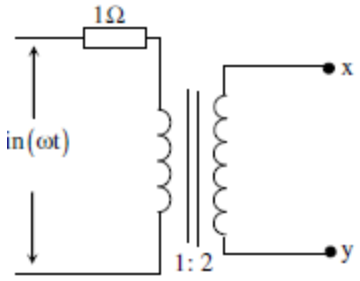
(8)

b. Obtain the h and y parameters of the two-port as given in figure



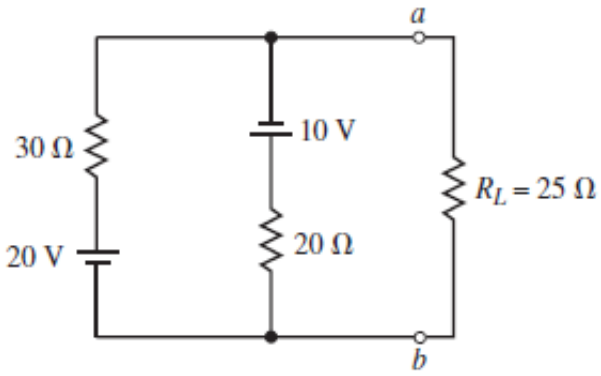
(8)

Q.4 a. Calculate the Thevenin's Equivalent voltage and impedance of the given figure as seen from the terminal x and y. Assume an Ideal transformer



(8)

b. Find current through 25 ohm resistor and power dissipated by it in the given circuit, using Millman's theorem



(8)

Q.5 a. A 50 Ω line is terminated to a load with unknown impedance. The standing wave ratio s = 2.4 is on the line and a voltage maximum occurs at λ/8 from the load,

i) Determine the load impedance,

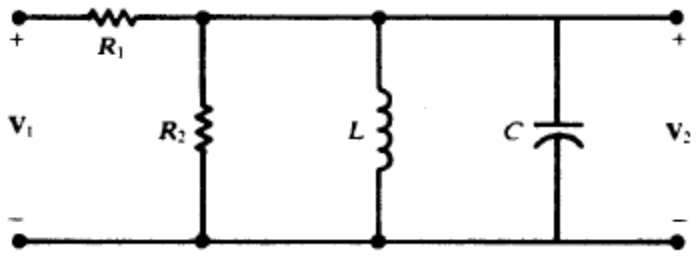
ii) How far is the first minimum voltage from the load? **(8)**

b. For a lossless two-wire transmission line, show that

i) The phase velocity $u = c = \frac{1}{\sqrt{LC}}$

ii) The characteristic impedance $Z_0 = \frac{120}{\sqrt{\varepsilon_r}} \cosh^{-1} \frac{d}{2a}$ **(8)**

Q.6 a. In the Fig. given below, let $R_1 = R_2 = 2$ kΩ, L= 10 mH, and C = 40 nF. Find the resonant frequency and bandwidth, and compare with the results for R_1 = 0 (pure Parallel circuit).



(8)

b. Derive the resonance frequency, Q factor and damping factor for parallel RLC circuit. **(8)**

Q.7 a. A 50 ohm load line feeds an inductance load $Z = 35 + j\,35$ ohm. Design a double stub tuner to match the load of the line (make use of smith'S Chart) **(8)**

b. What are the special consideration of radio frequency lines ? A radio frequency line with $Z_0 = 70$ ohm is terminated by $Z_l = 115 - j\,80$ ohm at $\lambda = 2.5$ m. Find the VSWR and maximum and minimum line impedances **(8)**

Q.8 a. A 50-ohm line feeds a half-wave dipole antenna with impedance of 73+j42.5 ohms. The line has matched-line loss of 3 dB. What is the total loss of the line? What is the SWR at the load and at the line input? If the line length is doubled, what is the matched-line loss, the total loss, the input and load SWRs? **(8)**

b. Write short notes on
i) Reflection coefficient ii) Impedance matching device **(8)**

Q.9 a. Write a short note on m-derived filter & derive the formula of 'm' for m-derived low pass filter section. **(8)**

b. Derive the design equation for symmetrical 'T-attenuator **(8)**