Roll No. Total No. of Pages : 03

Total No. of Questions : 18

B.Tech. (EE) (2012 Onwards) / (Electrical & Electronics Engg.) (2011 Onwards)
B.Tech. (Electronics & Electrical Engg./ Electrical Engineering & Industrial Control) (2012 to 2017) (Sem.–3)

CIRCUIT THEORY

Subject Code : BTEE-301
M.Code : 57092

Time : 3 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 attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

Answer briefly :

1. State and derive maximum power transfer theorem.
2. State convolution theorem.
3. What are filters and state its various types?
4. What are open circuit parameters? Give the equivalent circuit.
5. Define decibel and Neper.
6. Define reciprocity networks and give the condition of reciprocity in context to two-port networks.
7. What is the difference between active and passive elements? Give example.
8. If a 10V battery is connected across the parallel resistors of 3Ω, 5Ω, 10Ω and 20Ω, how much voltage and current will be there across 5Ω resistor?
9. Give the condition for selecting the resonant frequency in m-derived high pass and low-pass filters.

10. What is the driving point impedance at port one with port two open circuited for the given circuit :

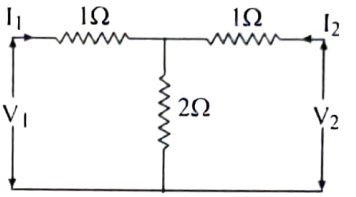

Fig.1

SECTION-B

11. For the given two port network calculate the short circuit parameters.

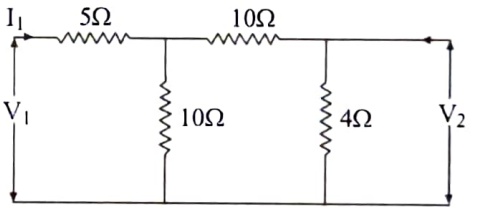

Fig.2

12. Find the frequency at which a prototype T-section lowpass filter having cut-off frequency f_c have an attenuation of 15dB.

13. Determine the current in the 5Ω resistor for the circuit shown using nodal analysis.

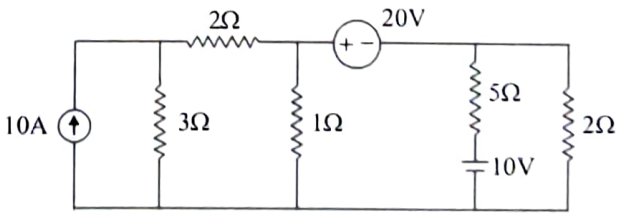

Fig.3

14. If $I(s) = \dfrac{s^2 + 5s + 9}{s^3 + 5s^2 + 12s + 8}$; find i(t)

15. In the circuit shown, steady state is reached with switch open. Switch is closed at t=0. Determine i(t) and v(t) for t>0.

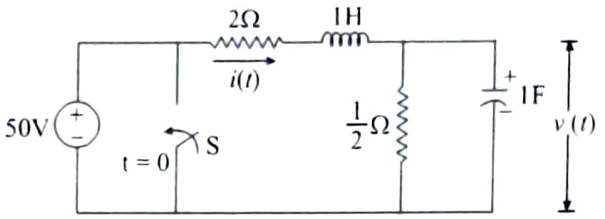

Fig.4

SECTION-C

16. The driving point impedance is given by :

$$Z(s) = 5\frac{\left(s^2+4\right)\left(s^2+25\right)}{s\left(s^2+16\right)}$$

Obtain the Foster-I and Cauer-II networks.

17. Design a *m*-derived high pass filter having cut-off frequency of 10KHz, design impedance of 600Ω and m=0.3.

18. Find current I_L in the 5Ω resistor using Thevenin theorem and verify the result using Norton theorem.

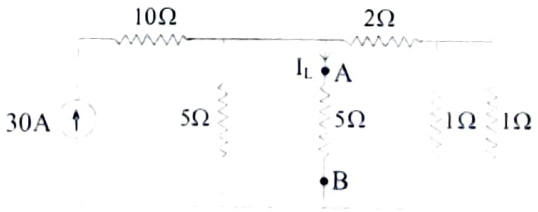

Fig.5

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.