Roll No. | | | | | | | | | | | | Total No. of Pages : 03

Total No. of Questions : 18

B.Tech. (ECE) (Sem.–3)

NETWORK THEORY

Subject Code : UC-BTEC-304-19

M.Code : 78749

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

Write briefly :

1. Relate unit impulse, unit step and unit ramp signals?
2. Draw waveform for the function $f(t) = u(t) - r(t-1) + r(t-2)$.
3. Differentiate between series and parallel resonance.
4. Draw *h*-model for BJT and write its characteristics equations.
5. Under what conditions we can transfer maximum power to the load?
6. How Routh-Hurwitz criterion is helpful in determining of system stability?
7. What are Dirichlet's conditions for Fourier Series?
8. Define image impedance for a 2-port network.
9. What is current division rule?
10. What are transmission parameters? Give characteristic equations.

SECTION-B

11. Solve following differential equation using Laplace Transform

$y'' - 5y' + 6y = 0, y'(0) = 2, \; y(0) = 0$

12. In reference to following star-delta equivalent circuits, determine R_a, R_b and R_c in delta connections when $R_1 = 6\Omega$, $R_1 = 18\Omega$ and $R_1 = 3\Omega$.

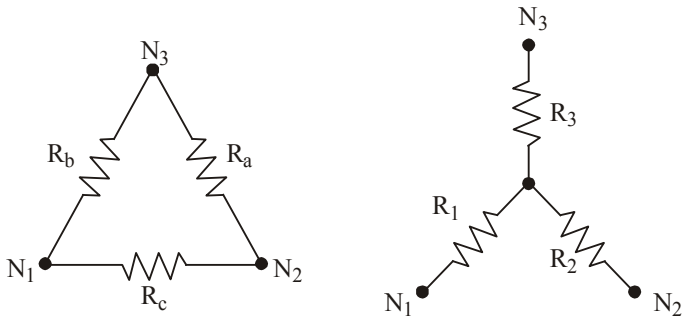

FIG. 1

13. Determine Z-parameters for following 2-port network.

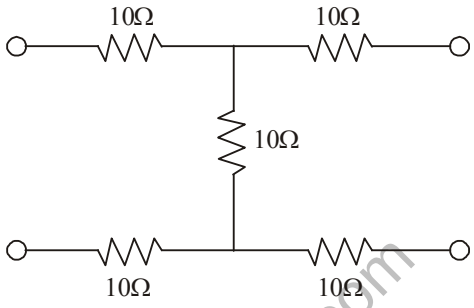

FIG. 2

14. Determine and plot output voltage V_0 (t) in following circuit when input voltage signal is given by V_i (t) = u (t) – u (t –1)

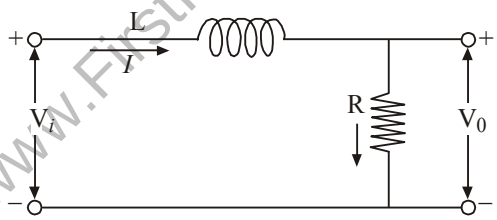

FIG. 3

15. Determine if following system H(s) is a stable system or not. Explain with reasons.

$$H(s) = \frac{s^4 + 2s^3 + s^2 + 3s + 4}{s^5 + 3s^4 + 2s^3 + s^2 + 2s + 1}$$

SECTION-C

16. Derive conversion formulas for 2-port networks:

    a) h-parameters into ABCD-parameters

    b) ABCD-parameters into Z-parameters

17. Synthesize following 1-port networks

    a) $Z(s) = \dfrac{10(s^2+4)\,(s^2+25)}{s(s^2+9)}$ using Foster-1 Form

    b) $Z(s) = \dfrac{s^3+4s}{s^4+20s+9}$ using Cauer-1 Form

18. a) Design constant-k (T-section & π-section) Low Pass Filters for given cut-off frequency $f_c = 2000$ Hz and design impedance $R_o = 400\Omega$.

    b) What are the advantages and disadvantages of both constant-k and m-derived filters?

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.