Set 3 BE_EXTC May_2020, RF Design PCC-ETC801 CBCGSH

1. Maximum power transfer from the output matching network to the transistor will occur when (1M)

    ΓL=Γin
    Γout=Γs
    Γout=Γs*
    ZL=Zs

2. If S11 = 0.9 ∟180 ◦ , S12 = 0.031∟ −9 ◦ ,S21 = 4.250∟61 ◦ ,S22 = 0.57∟ −120 for a transistor. Comment on its stability (2M)

    Conditionally stable
    Unconditionally stable
    Unstable
    oscillator

3. Find k value if S11 = 0.9 ∟180 ◦ ,S12 = 0.031∟ −9 ◦ ,S21 = 4.250∟61 ◦ ,S22 = 0.57∟ −120 (2M)

    0.045
    0.99
    0.383
    1.9

4. For the given s-parameters of a transistor calculate maximum gain S11 = 0.75∟180 ◦ ,S12 = 0,S21 = 4. 50∟61 ◦ ,S22 = 0.25∟ −100 (2M)

    16.92 dB
    25.1dB
    0.96dB
    1.616dB

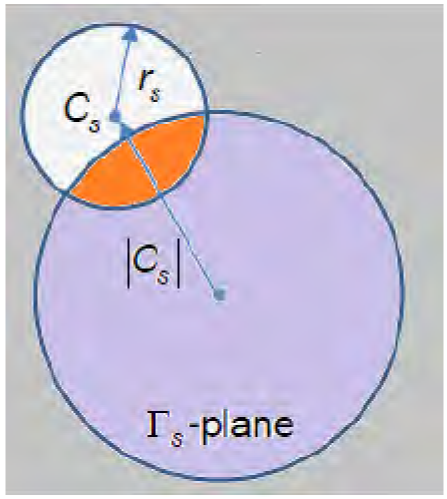
5. A transistor having S parameters as S11= 0.6 < -163,S12=0.039 < 35, S21= 7.12<86, S22= 0.5∟-38. what is centre for input stability circle (2M)

    1.75∟171.48.
    1.67∟-48
    1.3∟-48 d.
    1.5∟100

6. For the diagram input stability circle id drawn. If S22>1 then which portion of the diagram is stable region. (1M)

    White.
    violet
    orange.

not inside any circle



7. Major drawbacks of Constant K filter is (1M)
   Slow attenuation rate after cut-off
   Fast attenuation rate after cut off
   Constant image impedance
   Simple design

8. The Matching section of composite filter consist of (1M)
   Pi sections
   Bisected pi sections
   T section
   Bisected T section

9. For a High-pass composite filter with a cut off frequency of 4 MHz and impedance of 50ohm. There is infinite attenuation pole at 2.05 MHz. Calculate value of m (2M)
   0.861
   0.79
   1.861
   1.79

10. For a low-pass composite filter with a cutoff frequency of 2 MHz and impedance of 50ohm. There is infinite attenuation pole at 2.05 MHz. Calculate inductor value of constant k filter. (2M)
    7.95 µH
    3.19 nH
    8.88 µH
    3.19 µH

11. For Chebyshev T LP filter with g1=2.7108, g2=0.8326, g3=2.7108, g4=1 and having 25MHz cut-off frequency. Calculate value of Inductor for internal impedance 75 ohm. (2M)
    1.294µF

1.97μF
4.88 μF
2.56μF

12. While designing a constant-k low pass filter (T-section) shown below, what would be the value of capacitor if L/2 = 20mH, R0 = 500 Ω and fc = 5 kHz? (2M)
    0.0635 μF
    0.10 μF
    0.1273 μF
    0.20 μF

13. For a maximally flat low-pass filter with a cut off frequency of 100 GHz, impedance of 50 ohm and at least 5 dB insertion loss at 400 MHz. Calculate No of elements. (2M)
    2
    7
    2
    8

14. For 0.5dB equal-ripple pass band response if g1 = 1.5963, g2 = 1.0967, g3 = 1.5963, g4 = 1.0000 and cut-off frequency 10MHz Calculate length of the series stub (2M)
    3.75 m
    5 m
    0.75 m
    30m

15. One port oscillator uses------ at termination port (1M)
    PN junction diode
    transistor
    IMPATT diode
    resistor

16. Calculate input impedance of one port oscillator if Γin = 1.75∟40 at 4GHz and Z0=50 ohm (2M)
    -74.62+j81.43
    -76.153+ j84.42
    -74.62- j81.43
    76.153+ j84.42

17. For one port oscillator design if Zin = -55.6+j102 ohm what load value load impedance is required for oscillations (1M)
    55.6+ j102
    -43.6+j122
    43.6-j122
    -43.6- j122

18. Common-mode noise can be suppressed using ----------- choke coils. (1M)

Common-mode
Differential-mode
Multimode
Transformer

19. When a common ferrite is placed on both signal and return paths, -------------- noise is attenuated. (2M)
Both common mode and differential mode
Only differential mode
Only common mode
No

20. Cable to cable coupling can also be reduced by -------------- over two transmission lines. (1M)
Reducing separation
Adding cable shield
Adding inductor
Adding capacitor

21. EMC ground is ----------------- impedance plane for voltage reference of signals. (2M)
Infinite
Zero
1 k Ω
1 MΩ

22. -------------------- is one of the techniques to avoid common mode impedance coupling. (1M)
Multipoint grounding
Shunt impedance
Removing ground
shorting each device with each other

23. Hybrid grounding technique works as single point ground at ---------------- frequency (2M)
Low
High
Medium
Both high and low

24. When individual ferrite is placed on both the signal and return paths ----------- noise is suppressed. (1M)
Only differential mode
Only common mode
Both common mode and differential mode
No

25. Cable to cable coupling can also be reduced by -------------- between two transmission lines.
Reducing separation
Increasing separation
Adding inductor
Adding capacitor (1M)

18. Cable to cable coupling can also be reduced by -------------- both wire pairs transmission lines.
twisting

Reducing separation between
Adding inductor between
Adding capacitor between (1M)

26. Protection of equipment and personnel from the hazards of lightening discharge, make --------- very necessary. (1M)
    Bonding
    Insulation
    Use of insulated cabinet
    Use of thick insulation
27. Shield effectiveness is the ratio of -------------------------. (2M)
    Magnitude of incident electric field to transmitted electric field
    Magnitude of incident magnetic field to transmitted electric field
    Magnitude of incident electric field to transmitted magnetic field
    Magnitude of incident electric field to transmitted power
28. A shield is good when ---------------- is more (1M)
    absorption loss
    Insulation
    Impedance of shield
    Its resistivity
29. Apertures on shield enclosure ------------ shielding effect. (1M)
    Improves
    Reduces
    is called
    does not cause any change in
30. A desired slot in the shield is replaced by--------- (1M)
    Small holes
    Transparent insulator
    Electrically opaque insulator
    A thick wooden block

31. Direct digital synthesizers utilize ---------------to construct an output signal waveform in the time domain piece by piece from a base (clock) signal. (1M)
    Comparator
    amplifier
    digital signal processing
    divider

32. Typical conversion loss numbers for a single-diode doubler are in the order of -- dB. (2M)
    10
    20
    0-5
    5-9

33. A direct frequency synthesizer offers ---------- switching speed as compare to indirect frequency synthesizer. (1M)

Excellent

poor

just sufficient

lower

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1. In a unilateral amplifier is said to be unconditionally stable if (1M)
   S11<1
   S12=0
   S21>1
   S11>1

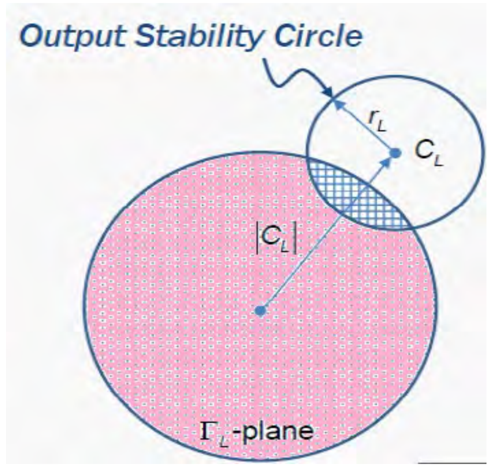
2. A transistor having S parameters as S11= 0.5∟-100, S12=0, S21=5∟50, S22=0.9∟-60. Comment on stability. (2M)
   Conditionally stable.
   Unconditionally stable.
   Unstable.
   partially Stable

3. For the given s-parameters of a transistor calculate k :S11= 0.674∟-152, S12=0.075∟6.2, S21=1.74∟36.4, S22=0.6∟-92.6 (2M)
   1.284
   0.99
   0.383
   1.9

4. For the given s-parameters of a transistor if S11= 0.65∟-95, S12=0.035∟40, S21=5∟115, S22=0.8∟-35. Determine centre of output stability circle. (2M)
   1.3∟48.
   1.67∟-48
   1.3∟-48 d.
   1.5∟100

5. For a transistor if S11= 0.55∟-171.3, S12=0.057∟16.3, S21=2.058∟28.5, S22=0.572∟-95.7 Find Figure of merit (2M)
   0.0786
   0.99
   0.383
   1.9

6. For the diagram output stability circle id drawn. If S11>1 then which portion of the diagram is stable region. (1M)
   White.
   pink
   blue.
   not inside any circle



7. In Richards' transformation stubs can be physically separated by (1M)
   - Unit element
   - Series stub
   - Shunt Stub
   - Impedance element

8. The advantages of insertion loss methodis (1M)
   - Complicated design
   - Shape pass and stop band of filter
   - Increased loss
   - Ideal response

9. For m-derived LP filter with the following specifications Ro= 50Ω, fc= 60 MHz and f∞= 75 MHz. Calculate value of m (2M)
   - 0.6
   - 0.79
   - 1.861
   - 1.79

10. For a constant K-filter with the following specifications Ro=75 Ω, fc= 250 MHz what value of inductor is required (2M)
    - 0.096µH
    - 16.97pH
    - 41.88MH
    - 0.056µH

11. For Chebyshev T filter having 1.0dB ripple with g1=1.4029, g2=0.707 and g3=1.9841 and having 40MHz cut-off frequency. Calculate value of capacitor for internal impedance 50 ohm. (2M)
    - 159 .1pF
    - 160.97pF
    - 141.88 pF

125.56pF

12. For a low -pass filter by the image parameter method with the following specifications: R0 = 75, fc = 25MHz. What is the value of Inductor will you use? (2M)
    0.955µH
    0.169 µH
    4.188 µH
    2.556 µH

13. For a Butterworth low-pass filter with cut-off frequency 20MHz and 30 dB insertion loss at 60 MHz Calculate No of elements. (2M)
    3
    5
    2
    6

14. For 1dB equal-ripple pass band response if g1 = 2.0237, g2 = 0.9941, g3 = 2.0237, g4 = 1.000.Calculate, impedance of shunt stub for T filter. (2M)
    1.005 ohm
    2.0237 ohm
    0.9941ohm
    1.0237 ohm

15. Negative resistance implies (2M)
    Γin=1
    Γin=0
    Γin<1
    Γin>1

16. Calculate input impedance of one port oscillator if Γin=1.5∟40 at 4GHz and Z0=50 ohm
    -65.65+ j101.28 (2M)
    67+j122
    2.63+j122
    5.414+j101.28.

17. For one port oscillator design if Γin = 1.45∟50calculate Zin required for oscillations if Z0=100 ohm (2M)
    -89.02+ j179.38
    89.02- j179.38
    93.6-j122
    -93.6- j122

18. Common mode impedance coupling interference can also be mitigated by ------------- (1M)
    Shunt impedance
    Single point grounding

Removing ground
shorting each device with each other

19. ------------------- technique has single and multi-point grounds. (1M)
Hybrid grounding
Multipoint grounding
High and low grounding
High frequency grounding

20. Hybrid grounding technique works as multi point ground at ---------------- frequency (2M)
Low
High
Medium
Both high and low

21. The interference due to coupling between source and victim separated without any wired connection is called--------------. (1M)
Source Victimization
Radiated EMI
Conducted EMI
load Victimization

22. If cables and signal transmission lines are poorly ------------- then radiated EMI occurs. (2M)
Installed
Shielded
Manufactured
Separated

23. -------------- coupling of EM energy leads to radiated EMI. (1M)
Capacitive
Resistive
Conducted
Source-victim

24. A ----------------- choke coil is used to suppress common-mode noise. (1M)
Common-mode
Differential-mode
Multimode
Transformer

25. -------------- noise can be attenuated with the help of a common ferrite placed on both signal and return paths. (2 M)
Both common mode and differential mode
Only differential mode
Only common mode
No

26. --------------- over two transmission lines can also be used to reduce cable to cable coupling.(1M)
Reducing separation
Adding cable shield
Adding inductor
Adding capacitor

27. Accumulation of static charges can be prevented with the help of -------------. (1M)
Highly insulated cabinet
Bonding
A thick insulator
Thin Insulated cover for entire circuit

28. A shield is good when ---------------- is more (1M)
Reflection loss
Insulation
Impedance of shield
Its resistivity

29. Shielding is compromised due to intentional------------- (1M)
Low impedance
Ventilation and slots
High insulated coating
Inclusion of high resistive coating

30. A slot in the direction of --------------- has much less effect on the shielding (1M)
Current
Voltage
Power
Radiated field

31. Small holes replacing slot in a shield behave like ---------------. (1M)
Transmission path
Waveguide
Cooling medium
high impedance current path

18. The elementary dividers are ------------- to obtain higher division coefficients in frequency divider in frequency synthesizer. (1M)
Cascaded
Cascaded
D-F/F
T-F/F

29. A ------------------- component is used as multiplier in a frequency synthesizer. (1M)
Low pass filter
band pass filter
nonlinear
linear

31. ----------- switching speed is achieved in a direct frequency synthesizer as compare to indirect frequency synthesizer. (1M)

Excellent
poor
just sufficient
lower