Assignment V (Passive Components)

- *Tick the most appropriate answer.*
- *All symbols have their usual meaning.*

1. For maximum mono-mode bandwidth of a dielectric resonator of height d and radius a the ratio d/2a should be
   (a) 0.25   (b) 0.4   (c) 0.6   (d) 0.75.
   Ans. (b) 0.4

2. The mono-mode bandwidth of the $TE_{01\delta}$ mode of a dielectric resonator (DR) can be increased by using
   (a) open loop resonator (b) ring resonator (c) square shaped resonator (d) none of these.
   Ans. (b) ring resonator.

3. For an antenna which parameter must have lower value?
   (a) Q_{rad} (b) $Q_{conductor}$ (c) Q_d (d) Q_{ext}.
   Ans. (a) Q_{rad}

4. At millimetre wave frequencies, loss of a waveguide resonator is dominated by
   (a) dielectric loss   (b) conductor loss   (c) radiation loss (d) all of these.
   Ans. (b) conductor loss**.**

5. Usually the shape of a dielectric resonator antenna (DRA) that provides maximum bandwidth is
   (a) Hemispherical (b) cylindrical (c) cuboid (d) conical.
   Ans. (c) cuboid

6. To decrease the passband insertion loss of a bandpass filter, high Q_U resonators must be used to design
   (a) wideband filters (b) narrow band BPF (c) antenna (d) all of these.
   Ans. (b) narrow band BPF.

7. Which type of filter offers best group delay performance among these fours?
   (a) Butter worth   (b) Chebyshev   (c) Gaussian   (d) Elliptic.
   Ans. (c) Gaussian.

8. Best stop band rejection can be achieved for
   (a) Butter worth filter (b) Chebyshev filter   (c) Gaussian filter   (d) Elliptic filter.
   Ans. (d) Elliptic filter.

9. Group delay can be determined from the
   (a) slope of the phase of transmission coefficient (b) slope of the phase of reflection coefficient (c) from both of them (d) magnitude of transmission coefficient.
   Ans. (a) slope of the phase of transmission coefficient.

10. Resonant frequency of a single resonator can be determined most accurately from the frequency plot of
    (a) magnitude of $|S_{11}|$ (b) magnitude of $|S_{21}|$ (c) group delay of $|S_{11}|$ (d) phase of $|S_{21}|$.
    Ans. (c) group delay of $|S_{11}|$.

11. External Q factor gives the idea about

(a) loss of a resonator (b) coupling between two resonators (c) loss of external circuit (d) coupling between the resonator and the external circuit.

Ans. (d) coupling between the resonator and the external circuit.

12. If the coupling between two resonators is due to the fringing electric field then the nature of the coupling is
    (a) electric (b) mixed (c) magnetic (d) all of these.
    Ans. (a) electric.

13. In-band loss of one bandpass filter depends on
    (a) Q_U of the used resonators (b) bandwidth of the filter (c) order of the filter (d) all of these.
    Ans. (d) all of these.

14. In-band loss of one bandpass filter is
    (a) inversely proportional to Q_U of the resonators (b) inversely proportional to bandwidth of the filter (c) both (a) and (b) (d) none of the above.
    Ans. (c) both (a) and (b).

15. A practical transmission line is dispersive for
    (a) non uniform impedance of the line (b) losses of the line (c) all of these (d) none of the above.
    Ans. (a) non uniform impedance of the line

16. For two magnetically coupled resonators, which resonance frequency is lower?
    (a) odd mode   (b) even mode (c) depends on the types of resonators (d) can't be said.
    Ans. (b) even mode.

17. At resonance, the group delay of |S_{11}| of a single resonator will be
    (a) maximum (b) minimum (c) maximum or minimum depending on the coupling with external circuitry (d) maximum or minimum depending on the Q_U of the resonator .
    Ans. (a) maximum.

18. A wide band BPF requires
    (a) higher coupling and higher Q_{ext} (b) lower coupling and higher Q_{ext} (c) lower coupling and lower Q_{ext} (d) higher coupling and lower Q_{ext}.
    Ans. (d) higher coupling and lower Q_{ext}.

19. If λ_g is the guided wavelength at the operating frequency, then arm lengths of a conventional branch line coupler (BLC) are
    (a) $\lambda_g/2$ (b) $\lambda_g/8$ (c) $\lambda_g/4$ (d) λ_g..
    Ans. (c) $\lambda_g/4$.

20. The coupler that can provides 180° phase difference between the output port is
    (a) Lange coupler (b) directional coupler (c) branch line coupler (d) rat race coupler.
    Ans. (d) rat race coupler.

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