University of Mumbai

Examination 2021 under cluster 5 (Lead College: APSIT)

Examinations Commencing from 01st June 2021

Program: Electronics and Telecommunication Engineering

Curriculum Scheme: Rev 2016

Examination: TE Semester VI

Course Code: ECC603 and Course Name: Antenna and Radio Wave Propagation

Time: 2 hour Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	The far field is indicated by the presence of
Option A:	r term
Option B:	1/r term
Option C:	$1/r^2$ term
Option D:	$1/r^3$ term
2.	An antenna has a field pattern E (θ) =cos θ cos 2θ. The first null beam width of the antenna is:
Option A:	45^0
Option B:	90^0
Option C:	180^0
Option D:	120^0
3.	The following is an advantage of microstrip antennas
Option A:	low gain
Option B:	low efficiency
Option C:	Small size
Option D:	Low directivity
4.	The radiation resistance of folded dipole with four arms is
Option A:	73 Ω
Option B:	292 Ω
Option C:	657 Ω
Option D:	1168 Ω
5.	A circular loop antenna has a diameter of 1.5 λ has radiation resistance of
Option A:	270 Ω
Option B:	2790 Ω
Option C:	27.9 Ω
Option D:	27 Ω
6.	Antenna is a _____ element.
Option A:	Passive
Option B:	Active
Option C:	Resistive
Option D:	Capacitive

7.	If the length of an antenna is changed from 2 meters to 2.5 meters, its resonant frequency will
Option A:	Increase
Option B:	Depend on the velocity factor so the resonant frequency can either be increased or decreased
Option C:	Unchanged
Option D:	Decrease
8.	Increasing the width _____ the impedance, while length affects the _____ in the MSA.
Option A:	Decreases, frequency
Option B:	Increases, frequency
Option C:	Decreases, beamwidth
Option D:	Increases, beamwidth
9.	For end-fire array, the progressive phase shift should be
Option A:	Zero
Option B:	Infinite
Option C:	Finite
Option D:	-βd
10.	In log periodic antenna, the impedance is periodic with
Option A:	The logarithm of the frequency
Option B:	The logarithm of the gain
Option C:	The logarithm of the directivity
Option D:	The logarithm of the power
11.	The overall radiation pattern of an array does not depend on
Option A:	Geometrical pattern of placing array elements
Option B:	Polarization of the antenna
Option C:	Distance between individual elements
Option D:	Excitation of the individual element of an array
12.	In pattern multiplication of identical isotropic sources
Option A:	The field patterns are added and phase pattern are multiplied
Option B:	The field and phase pattern gets added
Option C:	The field patterns are multiplied and phase pattern are added
Option D:	The field and phase pattern gets multiplied
13.	If a linear uniform array consists of 7 isotropic elements separated by λ/4, what would be the directivity of a broadside array in dB?
Option A:	6.53 dB
Option B:	7.99 dB
Option C:	8.55 dB
Option D:	5.44 dB
14.	HPBW of H-plane horn with aperture dimension 10 λ in degrees is ____
Option A:	56
Option B:	67
Option C:	5.6

Option D:	6.7
15.	The grid wired corner reflector are used
Option A:	To increase the bandwidth
Option B:	To reduce the weight of the antenna system
Option C:	To achieve circular polarization
Option D:	To reduce height of antenna
16.	If an EM wave whose frequency is 30 MHz is incident with an angle of 60^0 , MUF is
Option A:	60 MHz
Option B:	20 MHz
Option C:	30 MHz
Option D:	10 MHz
17.	If the length of aperture in a pyramidal horn antenna is 10 cm and δ for the design is 0.25. Then, the flaring angle of the pyramidal horn is:
Option A:	30^o
Option B:	25.4^o
Option C:	45^o
Option D:	60^o
18.	Ground wave is effective when the transmitting and receiving antennas are
Option A:	Vertically polarized
Option B:	Horizontally polarized
Option C:	Elliptically polarized
Option D:	Circularly polarized
19.	In the two-antenna method of an antenna gain measurement system,
Option A:	Two antennas should have different gain
Option B:	Two antennas should have same gain
Option C:	Two antennas should have same impedance
Option D:	Two antennas should have same radiation pattern
20.	Horn is treated as a/an _____ antenna.
Option A:	Linear
Option B:	Planar
Option C:	Aperture
Option D:	Array

Q2	**Solve any Two Questions out of Three**	**10 marks each**

A	Design dipole antenna at frequency 3 GHz, diameter of antenna is less than λ/10. Compare dipole, monopole and folded dipole antennas.
B	Design rectangular microstrip antenna for 2.45 GHz. Select substrate refractive index $\varepsilon_r = 2.32$, h = 1.6 mm, tan $\delta = 0.001$.
C	Write a short note on feeding methods of parabolic antenna. A 64 meter diameter parabolic reflector fed by a non-directional antenna at 1430 MHz. Calculate Half Power Beamwidth (HPBW) and First Null Beamwidth(FNBW).

Q3	**Solve any Two Questions out of Three** **10 marks each**
A	Explain the working principle of Yagi-Uda antenna and draw its radiation pattern. Mention its applications.
B	Derive Friss transmission formula. State its significance in wireless communication. A radio link has a 15 W transmitter connected to an antenna of 2.5 m^2 effective aperature at 5 GHz. The receiving antenna has an effective aperature of 0.5 m^2 and is located at a 15 km line of sight distance from the transmitting antenna. Assuming lossless, matched antennas, find the power delivered to the receiver.
C	Define critical frequency, Maximum usable frequency, Virtual height and Skip distance. Derive the relation between MUF and Skip distance.