University of Mumbai
Examination June 2021
Examinations Commencing from 1ˢᵗ June 2021
Program: **TE EXTC**
Curriculum Scheme: Rev2016 Examination: TE Semester VI
Course Code:ECC603 and Course Name: ARWP

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.	Which of the following is NOT a Maxwell's equation? (Bold letters indicate vectors)
Option A:	$\nabla\cdot B = 0$
Option B:	$\nabla\cdot D = \rho_v$
Option C:	$\nabla\times H = J + \frac{\partial D}{\partial t}$
Option D:	$\nabla\times E = B$
2.	An antenna has uniform radiation intensity in all directions. The directivity of the antenna is
Option A:	1
Option B:	0
Option C:	0.5
Option D:	0.25
3.	As the aperture area of an antenna increases, its gain
Option A:	Increases
Option B:	Reduces
Option C:	Remains same
Option D:	Unpredictable
4.	Which of the following antennas has typically the highest gain?
Option A:	Horn antenna
Option B:	Hertzian dipole
Option C:	Handy antenna
Option D:	Isotropic radiator
5.	The measured half power beamwidths (HPBW) of an antenna in the two orthogonal planes are 30° and 20°. What will be the approximate directivity of the antenna in dBi?
Option A:	4.8
Option B:	9.9
Option C:	18.4
Option D:	22.4

6.	In _____ and _____ range of frequencies are most omnidirectional horizontally polarized antennas used?
Option A:	VHF, UHF
Option B:	VLF, LF
Option C:	SH, EHF
Option D:	MF, HF
7.	A quarter wave monopole antenna operates at 25 MHz. The length of antenna is
Option A:	3 m
Option B:	48 m
Option C:	6 m
Option D:	12 m
8.	The radiation resistance of a circular loop of 1 turn is 0.01 ohms. The radiation resistance of 5 turns in ohms will be
Option A:	0.01
Option B:	0.25
Option C:	0.05
Option D:	0.002
9.	A N-turn circular loop antenna has a diameter of 2 cm, and the wire diameter is 1 mm. It is wound on the ferrite core, whose effective permeability is 10. How many turns are required to obtain Rin = 50 ohm at 3MHz
Option A:	127485
Option B:	127655
Option C:	137485
Option D:	127385
10.	What is a typical advantage of arrays?
Option A:	Lower gain
Option B:	More Radiation
Option C:	Smaller size
Option D:	Better directivity
11.	If the length of elements of an array is greater than $\lambda/2$, which will be the operating region of an array?
Option A:	Transmission line region
Option B:	Active region
Option C:	Reflective region
Option D:	Refractive region
12.	Parasitic element that is typically about 5 percent longer than the half-wave dipole-driven element is called _____
Option A:	Array element
Option B:	Director element
Option C:	Reflector element

Option D:	Driven element
13.	Parabolic reflector antenna performs which of the following conversion mechanism?
Option A:	Plane to spherical wave
Option B:	Spherical to plane wave
Option C:	Plane to Elliptical wave
Option D:	Spherical to Elliptical wave
14.	The ratio of the focal length to the diameter of the mouth of the parabola is called _____
Option A:	aperture
Option B:	focal point
Option C:	foci
Option D:	major axis
15.	Using a small reflector to beam waves to the larger parabolic reflector is known as
Option A:	Focal feed
Option B:	Horn feed
Option C:	Cassegrain feed
Option D:	Coax feed
16.	At 20 GHz, the gain of a parabolic dish antenna of diameter 1 metre and 70 % efficiency is around
Option A:	15 dB
Option B:	25 dB
Option C:	35 dB
Option D:	45 dB
17.	The widely used shape for patch antennas is …………..
Option A:	Rectangular
Option B:	Circular
Option C:	Elliptical
Option D:	Parabolic
18.	Compared to conventional microstrip antenna compact microstrip antenna has
Option A:	Lower gain
Option B:	Higher Bandwidth
Option C:	Higher gain
Option D:	Lower input impedance
19.	What will be the length of RMSA for Wi-Fi application (2.400 to 2.483 GHz)? Chose Substrate: εr = 2.32, h = 0.16 cm and tan δ = 0.001
Option A:	4.7cm
Option B:	3.9cm
Option C:	5.7cm

Option D:	6.7cm
20.	Which antennas are renowned as patch antennas especially adopted for space craft applications?
Option A:	Aperture
Option B:	Microstrip
Option C:	Array
Option D:	Lens

Q2	
A	**Solve any Two 5 marks each**
i.	Define Radiation Intensity with relevant equation.
ii.	Define Directivity with relevant equation.
iii.	Show that directivity of an isotropic antenna is unity.
B	**Solve any One each** **10 marks**
i.	1. What is maximum power received at a distance of 0.5 km over free space for 1 GHz frequency. The system consists of transmitting antenna with 2.5 dB gain and receiving antenna with 20 dB gain and antenna is fed with 150 W power. 2.
ii.	3. Explain the radiation mechanism of antenna with single wire system.

Q.3	
A	**Solve any Two 5 marks each**
i.	*Compare broadside and end-fire array.*
ii.	*Derive an expression for array factor of N element linear array, where all elements are equally spaced and fed. Also find the expression for the position of principal maxima, nulls and secondary maxim*
iii.	List the five controls that shape the overall radiation pattern of an antenna array
B	**Solve any One each** **10 marks**
i.	*Given a linear, broadside uniform array of 10 isotropic elements with a separation of 4 between the elements, find the directivity of the array.*
ii.	Write a short note on Helical Antenna.