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CBCS SCHEME

15EC71

Seventh Semester B.E. Degree Examination, July/August 2021 **Microwave and Antennas**

Time: 3 hrs.

Max. Marks: 80

(08 Marks)

racti			Note: Answer any FIVE full questions.
nalpı			
as n			
s blank pages. = 50, will be treated as malpracti	1	a.	Derive the general transmission line equation to find voltage and current on the line interms of position 'z' and time 't'.
es. be ti		b.	With a neat diagram ovalor the anautics CD C VI
On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Any revealing of identification, appeal to evaluator and /or equations written eg. $42+8=50$, will be i			(08 Marks)
ank 0, w			
= 5	2	a.	Define transmission coefficient. Derive the equation for transmission coefficient of power
ning 3+8		1	(08 Marks)
nai , 42		b.	A transmission line has a characteristic impedance of $75 + i0.01\Omega$ and is terminated in a
rei n eg			load impedance of $70 + 150\Omega$. Compute:
the itter			i) Reflection coefficient
S OF			ii) Transmission coefficient
line			iii)Verify relation between reflection and transmission coefficient
oss			iv) Verify $T = 1 + \Gamma$. (08 Marks)
l cro r eg			(OD IVIAIRS)
ona d/o	3	a.	Evnlain non-reciprocal phase shiften with
liag r an	5	b.	Explain non-reciprocal phase shifter with a neat diagram. (08 Marks)
aw c		U.	In an H-plane T-junction, compute power delivered to the loads of 40Ω and 60Ω connected to arms 1 and 2 when a 10 may represent the second to arms 1 and 2 when a 10 may represent the second to a second to
' dra valu			to arms 1 and 2 when a 10mw power is delivered to the matched port 3. (08 Marks)
On completing your answers, compulsorily draw diagonal cross lines on the remaining Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8			
ulsc eal 1	4	a.	What are waveguide tees? Explain its types. (08 Marks)
app		b.	Briefly explain the applications of Magic – T. (08 Marks)
s, cc on,			(od Hzarks)
ver	5	a.	Explain the losses in microstrip lines.
ans		h	A lossless parallel strip line has a conductive of including the second strip line has a conductive of including the secon
our		0.	A lossless parallel strip line has a conducting strip width w. the substrate dielectric constant
g y of			∈ _{rd} of 6 (BeO) and a thickness 'd' of 4mm. Calculate: i) Width w of the strip to have a characteristic impedance of 500.
etin ling			- Francisco de chiaracteristic impedantee of 3052
mpl			ii) Strip-line capacitance iii) Strip-line inductance
y re			iv) Phase velocity of wave in populal stair line
			(08 Marks)
.1.			
Important Note: 1. 2.	6	a.	Define directivity. Derive the relation between:
ot N			i) Directivity and beam solid angle
ortai			ii) Directivity and effective aperture. (08 Marks)
mpc		b.	Show that maximum effective aperture of $\lambda/2$ dipole (Aem) = $0.13\lambda^2$ and Directivity = 1.63.
I			(00 Marsh

- a. Derive an expression and draw the field pattern for an array of two isotropic point sources with equal amplitude and opposite phase. (08 Marks)
 - b. Find the power and directivity of:
 - $i) \ U = U_{m} \sin^{2}\theta \quad \text{for} \quad 0 \leq \theta \leq \pi \ ; \ 0 \leq \varphi \leq 2\pi \ \rangle$
 - $ii)\,U=U_{_m}\cos^2\theta\quad\text{for}\quad 0\leq\theta\leq\frac{\pi}{2}\;;\;0\leq\varphi\leq2\pi\;.$

(08 Marks)

Derive the radiation resistance of thin $\lambda/2$ antenna.

(08 Marks)

- b. Explain:
 - i) Power theorem
 - ii) Multiplication pattern.

(08 Marks)

a. Derive the radiation resistance of small loop.

(08 Marks)

- b. Explain in brief with neat figure.
 - i) Horn Antenna
 - ii) Yagi Uda Antenna.

(08 Marks)

- 10 With neat diagram, explain the following
 - i) Log periodic antenna
 - ii) Helical antenna.

(08 Marks)

b. Find the directivity, beam width and effective area of the parabolic reflector for which the reflector diameter is 6m and apperature efficiency is 0.65. The frequency of operation is 10GHz. (08 Marks)