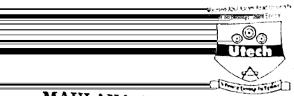
### CS/B.TECH/ECE/ODD/SEM-7/EC-703A/2017-18



### MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code: EC-703A

### RF AND MICROWAVE ENGINEERING

Time Allotted: 3 Hours

Full Marks: 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

( Multiple Choice Type Questions )						
			for any	ten of the $10 \times 1 = 10$		
i) Re:	flex Klystron is	s a/an				
a)	amplifier	b)	oscillator	•		
c)	attenuator	d)	filter.			
ii) Magnetron is a/an						
<u>                a</u> )	amplifier					
b)	oscillator					
c)	c) both amplifier and oscillator					

phase shifter.

70311

#### 017-18 CS

3/B.	TEC	H/ECE/ODD/SEM-7/E	C-70	)3A/2017 10
	:\ ^	Travelling Wave Tube is	, bas	ically
iii		An oscillator		
	a)	ınlifier		
	b)	and amplifier		
	c)	1100	scilla	ator.
	d)	ne most powerful solid s	tate	microwave device is
iv)		Gunn diode	b)	IMPATT diode
	a)			Varactor.
	c)	MESFET microwave frequency	ra, ra	nge, the most noisy
v)	In	microwave frequency miconductor device is		6-7
	a)	IMPATT	b)	TRAPATT
	c)	GUNN	d)	
:1	•	matched load is a	,	
VIJ	a)	Fixed attenuator	b)	Variable attenuator
	,	Phases shifter	d)	Rotary attenuator.
•••	c)	rge microwave power c		
V11)			er er	•
	a)			
	,	bolometer		
	•	wattmeter		
	d)	wave meter.	n h	e measured with the
viii)	) Mic	crowave frequency ca	com m	
/		p of a http://www.makaut.	b)	wave meter
	a)	frequency meter	ď)	CRO.
	c)	counter attering parameters o	an	be measured with th
ix)	Sca	ttering parameters		
		p of Spectrum Analyzer	b)	Network Analyzer
	a)	-	d)	Bolometer.
	c)	CRO rostrip power divider	is a	
x)		rosuip power arrange	b)	
	a)	two port network	d)	one port network.

three port network

c)

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#### xi) A cavity is a

- band pass filter
- high pass filter
- band stop filter
- low pass filter.

#### xii) Waveguide is a

- band pass filter
- high pass filter
- low pass filter
- all pass filter.

#### -GROUP - B

#### (Short Answer Type Questions)

 $3 \times 5 = 15$ Answer any three of the following.

- Discuss the high frequency limitation of transistors, comparing and contrasting them with those of vacuum 2 + 3rube. http://www.makaut.com
- Why ferrite device are called non reciprocal device. 3.
- What are the various sources of error in microwave power measurements and how can they be minimized?

3 + 2

- Why the conventional tubes like triode, tetrode cannot generate microwave power?
- Why TM<sub>01</sub> or TM<sub>10</sub> mode is not possible in rectangular waveguide?

#### GROUP - C

### ( Long Answer Type Questions )

Answer any three of the following.  $3 \times 15 = 45$ 

A 20 mW signal is fed into one of a lossless H-plane 7. a) T-junction. Calculate the power delivered through each port when other port are terminated in matched load.

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- Derive the wave equation for a TM wave and obtain all the field components in a rectangular waveguide.
- How are waveguide different from two wire transmission line? Discuss the similarities and 5 + 5 + 5dissimilarities. http://www.makaut.com
- For a directional coupler the incident power is 550 8. mW. Calculated the power I the main arm and auxiliary arm. The coupling factor is 30dB.
  - Describe the operation of Rate-Race junction.
  - Explain the double minimum method of measuring VSWR.
- A wave is propagated in a rectangular waveguide at 6 GHz. Calculate cutoff wavelength and group 9. velocity for dominant mode.
  - Describe the operations of 2-hole directional coupler. Give the various parameters of the directional coupler.
  - Describe the scattering matrix relation between the input and output of a  $(n \times n)$  junction.
- How is slotted line used for measurement of 10. a) impedance of unknown load?
  - Explain the working principle of two cavity klystron amplifier by giving the apple-gate diagram. b)
  - Explain the impedance matching network. c)

 $3 \times 5$ 

- Write short notes on any three of the following:
  - Magnetron http://www.makaut.com a)
  - IMPATT b)
  - Microstrip line c)
  - MESFET d)
  - Microwave filter. e)