

Enrollment No.....



Faculty of Engineering
End Sem (Even) Examination May-2022
EC3CO16 Microwave Engineering
Programme: B.Tech. Branch/Specialisation: EC

Duration: 3 Hrs.**Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

- Q.1 i. A transmission line is distortion less if- **1**
(a) $RL=1/GC$ (b) $RL=GC$ (c) $LG=RC$ (d) $RG=LC$
- ii. The VSWR can have any value between- **1**
(a) 0 & 1 (b) -1 & +1 (c) 0 & ∞ (d) 1 & ∞
- iii. The cut-off frequency of a waveguide depends upon: **1**
(a) The dimensions of the waveguide
(b) Reflection coefficient
(c) The characteristics impedance of the waveguide
(d) The transverse and axial components of the fields
- iv. Waveguide acts as a- **1**
(a) Low pass filter (b) High pass filter
(c) Band stop filter (d) Band pass filter
- v. Klystron operation is based on the principle of - **1**
(a) Velocity modulation (b) Amplitude modulation
(c) Frequency modulation (d) Phase modulation
- vi. A microwave junction is supposed to be matched if in the S-matrix- **1**
(a) All diagonal elements are zero
(b) All diagonal elements are equal but not zero
(c) All diagonal elements are complex
(d) None of these
- vii. Gunn Diode is made from- **1**
(a) Silicon (b) Germanium
(c) Gallium Arsenide (d) Selenium

P.T.O.

	viii.	Which of the following is a transferred electron device? (a) BARITT diode (b) IMPATT diode (c) TRAPATT diode (d) Gunn diode	1
	ix.	It is possible to overcome the drawback of m-derived filter by connecting number of sections in addition to prototype & m-derived sections with terminating _____. (a) One –fourth sections (b) Half sections (c) Square of three- fourth sections (d) Full sections	1
	x.	Attenuation in neper = C *attenuation in db, find the value of C. (a) 0.686 (b) 0.5 (c) 0.1151 (d) 1.414	1
Q.2	i.	List out various application of microwave and briefly explain any two of them.	2
	ii.	Explain lossy and lossless line and compare them.	3
	iii.	The characteristics impedance of a uniform transmission line is 20396.50 ohm at frequency of 800 Hz. At this frequency the propagation constant was found to be $0.054 \angle 87.9^\circ$. Determine the values of line constant R, L, C & G.	5
OR	iv.	Write short note on Smith chart and its applications.	5
Q.3	i.	How do TE & TEM wave differ? Explain strip line and micro strip lines.	2
	ii.	A rectangular waveguide has a=4cms; b=3 cms as its sectional dimensions. Find all the modes which will propagate at 5000 MHz.	8
OR	iii.	What is dominant mode and degenerate mode? What are the techniques for imitation of modes in rectangular waveguide?	8
Q.4	i.	Explain the properties of Scattering Matrix.	3
	ii.	Explain the working of directional coupler. Derive its scattering matrix.	7
OR	iii.	Explain the working of isolators in brief.	7

Q.5	i.	Explain IMPATT diode.	4
	ii.	Explain parametric amplifiers & Manley-Rowe relations.	6
OR	iii.	Write a short note on BARITT diode. What is a negative resistance phenomenon?	6
Q.6		Attempt any two:	
	i.	Explain composite filter.	5
	ii.	Explain m-derived high pass filter.	5
	iii.	Explain band pass filter using quarter wave resonator.	5

Marking Scheme
EC3CO16 Microwave Engineering

Q.1	i.	A transmission line is distortion less if- (c) $LG=RC$	1
	ii.	The VSWR can have any value between- (d) 1 & ∞	1
	iii.	The cut-off frequency of a waveguide depends upon: (a) The dimensions of the waveguide	1
	iv.	Waveguide acts as a- (b) High pass filter	1
	v.	Klystron operation is based on the principle of - (a) Velocity modulation	1
	vi.	A microwave junction is supposed to be matched if in the S-matrix- (a) All diagonal elements are zero	1
	vii.	Gunn Diode is made from- (c) Gallium Arsenide	1
	viii.	Which of the following is a transferred electron device? (d) Gunn diode	1
	ix.	It is possible to overcome the drawback of m-derived filter by connecting number of sections in addition to prototype & m-derived sections with terminating _____. (b) Half sections	1
	x.	Attenuation in neper = C *attenuation in db, find the value of C. (c) 0.1151	1

Q.2	i.	List out various application of microwave Briefly explain any two of them.	1 Mark 1 Mark	2
	ii.	Explain lossy Lossless line Compare them.	1 Mark 1 Mark 1 Mark	
	iii.	The characteristics	(1.25 Mark*4)	
OR	iv.	Write short note on Smith chart Its applications.	3 Marks 2 Marks	5

Q.3	i.	How do TE & TEM wave differ Explain strip line and micro strip lines.	1 Mark 1 Mark	2
	ii.	Find all the modes which will propagate at 5000 MHz. (2 Marks*4)		
OR	iii.	What is dominant mode Degenerate mode What are the techniques for imitation	2 Marks 2 Marks 4 Marks	8
Q.4	i.	Each properties	(1 Mark*3)	3
	ii.	Explain the working of directional coupler. Derive its scattering matrix.	3 Marks 4 Marks	
OR	iii.	working of isolators in brief.	(2+2+3) Marks	7
Q.5	i.	Explain IMPATT diode.	(2+2) Marks	4
	ii.	Explain parametric amplifiers Manley-Rowe relations.	3 Marks 3 Marks	
OR	iii.	Short note on BARITT diode. Negative resistance phenomenon	3 Marks 3 Marks	6
Q.6		Attempt any two:		
	i.	Explain composite filter.	(As per explanation)	5
	ii.	Explain m-derived high pass filter.	(As per explanation)	5
	iii.	Explain band pass filter using quarter wave resonator. (2 Marks + 3 Marks)		5
