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BTECH
(SEM. VI) THEORY EXAMINATION 2025-26
MICROWAVE ENGINEERING

TIME: 3 HRS

M.MARKS: 70

Note: Attempt all Sections. In case of any missing data; choose suitably.

SECTION A

1. Attempt <i>all</i> questions in brief.		02 x 7 = 14	
Q no.	Question	CO	Level
a.	Define phase velocity and group velocity in a waveguide.	1	K1
b.	Why are S-parameters preferred at microwave frequencies?	2	K1
c.	Define coupling factor of a directional coupler.	3	K1
d.	State the limitations of conventional tubes at microwave frequencies.	3	K2
e.	State one application of microwave solid-state devices.	4	K2
f.	What is a slotted line carriage?	5	K1
g.	Define the term VSWR.	5	K1

SECTION B

2. Attempt any <i>three</i> of the following:		07 x 3 = 21	
Q no.	Question	CO	Level
a.	Explain the TE and TM modes in rectangular waveguides with suitable field configurations.	1	K1
b.	What are scattering parameters and what are the properties of S-matrix for reciprocal and lossless networks?	2	K2
c.	Explain the principle of velocity modulation and bunching in klystrons.	3	K2
d.	What is the principle of operation of TRAPATT diode.	4	K2
e.	Describe the construction and working of a microwave power meter.	5	K2

SECTION C

3. Attempt any <i>one</i> part of the following:		07 x 1 = 07	
Q no.	Question	CO	Level
a.	Explain microwave communication and the electromagnetic spectrum.	1	K2
b.	Explain dominant TE ₁₀ mode with electric and magnetic field distributions in a rectangular waveguide. A rectangular waveguide has dimensions $a = 4$ cm, $b = 2$ cm. Calculate the cutoff frequency for TE ₁₀ mode.	1	K3

4. Attempt any <i>one</i> part of the following:		07 x 1 = 07	
Q no.	Question	CO	Level
a.	Briefly explain E-plane tee, H-plane tee, and magic tee.	2	K2
b.	Explain the working of microwave attenuators and phase shifters. An attenuator provides attenuation of 20 dB. Calculate output power if input power is 50 W.	2	K3



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5. Attempt any *one* part of the following:

07 x 1 = 07

Q no.	Question	CO	Level
a.	Discuss the principle and characteristics of traveling wave tubes (TWT).	3	K2
b.	Explain reflex klystron operation with Applegate diagram.	3	K2

6. Attempt any *one* part of the following:

07 x 1 = 07

Q no.	Question	CO	Level
a.	Write short note on Gunn diode, IMPATT diode, and BARITT diode.	4	K2
b.	What are the advantages and disadvantages of microwave solid-state devices.	4	K2

7. Attempt any *one* part of the following:

07 x 1 = 07

Q no.	Question	CO	Level
a.	Explain the measurement of VSWR using slotted line method. Calculate VSWR for reflected power 25 W and incident power 100 W.	5	K3
b.	What are the principles involved in frequency measurement at microwave frequencies?	5	K2