Name:.....
Roll No:.....

MAR ATHANASIUS COLLEGE OF ENGINEERING
KOTHAMANGALAM – 686666
(Govt. Aided Autonomous Institution)
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

B. TECH FIRST SERIES EXAMINATION, AUGUST 2026

(S7 ECE A & B) ECT401 MICROWAVES AND ANTENNAS

Max. Marks: 40 Duration: 1.5 Hours

PART A

Answer all questions. Each question carries 3 marks.

1. Discuss the role of a cavity resonator in microwave circuits . (CO4)
2. Compute the resonant frequency of the dominant mode for an air-filled cavity of dimensions a = 5 cm,b=2 cm, and d =15 cm. (CO4)
3. List the important properties of Scattering parameters. (CO5)
4. A microwave communication system requires a component that can split an input signal into two outputs and also combine multiple microwave signals with minimum reflection. Identify the suitable microwave waveguide component and explain why it is needed. (CO5)

PART B
Answer all questions. Each question carries 14 marks.

5. a. A reflex klystron is operated under the following condition V0 = 600V, L = 1mm ,Rsh = 15 KΩ, e / m = $1.759 * 10^{11}$, fr = 9GHz. The tube is oscillating at fr, at the peak of n = 2 mode or (3/4) mode. Assume that the transit time through the gap and beam loading can be neglected. (CO4)

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i) Find the value of Repeller voltage?

ii) Find the direct current necessary to give a microwave gap voltage of 200 V?

iii) What is the electronic efficiency under this condition?

b. A microwave communication system requires a compact, high-power oscillator. Explain, with a neat diagram, why a magnetron is suitable for this application and describe it's working. (CO4)

6. a. A microwave communication system requires a power divider that produces two output signals with a 180° phase difference. Recommend a suitable tee junction and derive its S-matrix to justify its performance. (CO5)

b. Describe the operation of an H-plane tee. With the help of its scattering matrix, demonstrate why it is referred to as a 3 dB splitter. (CO5)

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