

**B.TECH SEM - VII (2007 COURSE) (E & TC ENGG.) : WINTER -
2017**

SUBJECT : MICROWAVE DEVICES & CIRCUITS

Day **Friday**
Date **19/01/2018**

W-2017-2634

Time **02.30 PM TO 05.30 PM**
Max. Marks: 80

N.B.:

- 1) **Q.No.1 and Q.No.5 are COMPULSORY.** Out of the remaining questions attempt **ANY TWO** questions from each section.
- 2) Answers to both the sections should be written in the **SEPARATE** answer books.
- 3) Draw neat and labeled diagrams **WHEREVER** necessary.
- 4) Use of non-programmable **CALCULATOR** is allowed.
- 5) Figures to the right indicate **FULL** marks.
- 6) Assume suitable data if necessary.

SECTION – I

- Q.1** a) Define scattering matrix and state its properties for reciprocal and lossless network. **[05]**
- b) Define coupling coefficient, directivity and insertion loss for directional coupler. **[05]**
- c) Explain Reflex Klystron in brief. **[04]**
- Q.2** Write a short note on TE Modes in rectangular wave guide. Derive necessary equation. Explain Dominant mode in rectangular waveguide. **[13]**
- Q.3** a) Write a short note on : Circulator and Isolator. **[07]**
- b) Explain E-plane, H-plane and Magic Tree with their S-parameters. **[06]**
- Q.4** a) Explain Bunching process and velocity modulation in Reflex Klystron. **[07]**
- b) The parameter of a two cavity Klystron amplifier are $V_0 = 1200V$, $I_0 = 30 \text{ mA}$, $f = 10\text{GHz}$ Gap spacing in each cavity $d = 1 \text{ mm}$ spacing between two cavities $L = 4 \text{ cm}$ effective stand resistance of each cavity $= 40 \text{ K}\Omega$. find:
i) Input microwave voltage V_1 in order to generate maximum output voltage
ii) Determine voltage gain
iii) Calculate efficiency of amplifier **[06]**

SECTION – II

- Q.5** a) Write short note on parallel strip line. **[05]**
- b) Write short note on TWT. **[05]**
- c) Explain Gunn Diode and Gunn effect. **[04]**
- Q.6** a) Explain construction and working of magnetron. **[07]**
- b) A Helical TWT has diameter of 2mm with 50 turns per cm. Calculate axial phase velocity and anode voltage at which TWT can be operated for useful gain. **[06]**
- Q.7** a) Explain Varactor diode multiplier. Also comment on role of Varactor diode in frequency multiplication and parametric amplification at microwave frequency. **[07]**
- b) Explain in brief Microwave Tunnel Diodes. **[06]**
- Q.8** a) List different types of strip line. Explain any three in brief. **[07]**
- b) Explain PIN Diode and its equivalent circuit. **[06]**

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