

Code No: RT32044

R13**SET - 1****III B. Tech II Semester Supplementary Examinations, November- 2017****MICROWAVE ENGINEERING**

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)2. Answering the question in **Part-A** is compulsory3. Answer any **THREE** Questions from **Part-B**

PART -A

- 1 a) What are the various applications of microwave frequencies? [4M]
- b) Derive the expression of a Quality factor of rectangular cavity resonators. [4M]
- c) Explain scattering parameters in microwave components. [4M]
- d) Explain the bunching process in reflex klystron. [4M]
- e) Write the difference between TWT and klystron amplifier. [3M]
- f) What are methods present in the microwave power measurement? [3M]

PART -B

- 2 a) Derive the wave equation for a TM wave and obtain all the field components in a rectangular wave guides. [8M]
- b) A 10GHz signal is to be propagated through a rectangular waveguide. Calculate the dimensions of the waveguide, guide wavelength and phase velocity, for dominant mode of propagation. [8M]
- 3 a) A Circular waveguide operating in the dominant mode at a frequency of 9GHz with a maximum field strength of 300V/cm. The internal diameter is 5cm. Calculate the maximum power. [4M]
- b) A rectangular-cavity resonator has dimensions of $a=5$ cm, $b=2$ cm and $d=15$ cm, compute [12M]
(i) the resonant frequency of the dominant mode for an air-filled cavity.
(ii) the resonant frequency of the dominant mode for a dielectric-filled cavity of $\epsilon_r=2.56$
- 4 a) Explain the H-plane tee and determine its S-matrix. [8M]
- b) Describe in detail the operation of a 2-hole directional coupler, Calculate the coupling factor if the power in the primary waveguide is 72mw and the power delivered to the directional coupler is 8mw. [8M]
- 5 a) Explain in brief about the limitations of conventional vacuum tubes. [8M]
- b) Draw and explain of Two-cavity klystron amplifier. [8M]
- 6 a) Explain the function of HTWT. [8M]
- b) A normal cylindrical magnetron has the following parameters: [8M]
Inner radius $R_a=0.15$ meter, outer radius $R_b=0.45$ meter, Magnetic flux density $B_0=1.2$ milliwbebers/m².
(a) Determine the Hull cutoff voltage.
(b) Determine the cutoff magnetic flux density if the beam voltage V_0 is 6000V.
- 7 a) Draw and explain in detail about IMPATT diode. [8M]
- b) Draw the block schematic of typical microwave bench and explain the functionality of each block. [8M]
