

Answer any **FIVE** Questions

All Questions carry **equal** marks

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1. (a) Discuss how the microwave spectrum is categorized into different bands.  
(b) What is the need of microwave frequency? Explain different applications of microwaves.

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2. Derive equations for maximum energy stored and power dissipated in rectangular cavity.

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3. (a) Draw a typical directional coupler and define directivity and coupling coefficient.  
(b) Explain how the power is coupled from waveguide with the help of a probe.

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4. Show that the scattering matrix for a magic Tee is given by,

$$[s] = \frac{1}{\sqrt{2}} \begin{bmatrix} 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & -1 \\ 1 & 1 & 0 & 0 \\ 1 & -1 & 0 & 0 \end{bmatrix}$$

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5. (a) List out the various advantages of using microwave frequencies for various applications.  
(b) With the help of velocity diagram explain principle of two-cavity Klystron amplifier.

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  6. (a) What is a slow wave structure? Draw any four slow wave structures usable in a travelling wave tube.  
(b) Explain the possibility of oscillations in a TWT amplifier. Suggest method to prevent oscillations.  
(c) Discuss about the differences between a TWT and a Klystron.

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  7. (a) What is transferred electron effect? Explain clearly how a GUNN diode is different from a tunnel diode both being a negative resistance devices.  
(b) What is parametric amplifier? Explain it as an amplifier and frequency converter.

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  8. Describe the experiment of reflex Klystron characteristics to find the reflex Klystron output and frequency characteristics, mode number and transit time.