**Code: 9A04606** **R09**

B.Tech III Year II Semester (R09) Supplementary Examinations December/January 2015/2016

**MICROWAVE ENGINEERING**

(Electronics and Communication Engineering)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

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1 (a) Derive the expressions for cut off frequency, phase constant, group velocity, phase velocity and wave impedance in a rectangular wave guide.

(b) An rectangular wave guide is filled by dielectric material of Єr = 9 and has dimensions of 7× 3.5 cm. It operates in the dominant TE mode. (i) Determine the cut off frequency. (ii) Find the phase velocity in the guide at a frequency of 2 GHz. (iii) Find the guided wave length at 2 GHz.

2 A air-filled circular waveguide has a radius of 3 cm and is used as a resonator for $TE_{01}$ mode at 10 GHz by placing two perfectly conducting plates at its two ends. Determine the minimum distance between the two end plates.

3 (a) Draw a typical magic Tee junction and explain its operation to obtain sum and difference signal.

(b) Differentiate between isolators and circulators.

4 (a) Discuss the important parameters of ferrite devices.

(b) State and prove unitary property of S-matrix.

5 (a) Derive the relation between Repeller voltage and Accelerating voltage of a Reflex Klystron.

(b) Draw the equivalent circuit of a Reflex Klystron and explain.

6 (a) Explain the terms:
(i) Strapping.
(ii) Frequency pushing.
(iii) Frequency pulling.

(b) Discuss about the superposition of oscillations in a TWT.

7 (a) Distinguish between ATD's and TED's.

(b) Write short notes on negative-resistance parametric amplifier.

8 (a) Describe with neat diagram and mathematical formulation, the measurement of dielectric constant of a solid using rectangular waveguide method.

(b) What is slotted section with line carriage? What is the main purpose of slotted section with line carriage? Explain.

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