Code No: **R32042** **R10** **Set No. 1**

III B.Tech II Semester Supplementary Examinations, Dec - 2015

MICROWAVE ENGINEERING

(Electronics and Communication Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

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1 a) Derive the expression for cutoff frequency, phase constant phase velocity, group velocity and wave impedance in rectangular wave guide. [8]

b) Derive the expression [7]

$$\lambda = \frac{\lambda_g \lambda_c}{\sqrt{\lambda_g^2 + \lambda_c^2}}$$

Where λg guide wave length and λc is cutoff length for rectangular wave guides.

2 a) Derive the expression for resonant frequency of a rectangular cavity resonator. [8]

b) An air filled circular waveguide has a radius of 2 cm and is to carry energy at a frequency of 10GHz. Find all the TE and TM modes for which energy transmission is possible. [7]

3 a) Explain the working principle of directional coupler and derive the expression for directivity and coupling coefficient. [8]

b) Write short notes on circulator. [7]

4 a) Explain the characteristics of S matrix and derive the S matrix of E plane Tee. [8]

b) Write short notes of Gyrator. [7]

5 a) Draw the mode curves of Reflex klystron and derive the relation between mode number and repeller in Reflex klystron. [8]

b) In a two-cavity klystron the parameters are, input power=10mW, voltage gain=20dB, R_{sh} of input cavity =25KΩ, R_{sh} of output cavity =35KΩ, load resistance = 40 KΩ. Find input voltage, output voltage and the power to the load. [7]

6 a) With a neat sketch explain the structure and principle of operation of TWT amplifier. [8]

b) How is bunching achieved in a cavity magnetron? Explain. [7]

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7 a) What are the bulk properties of GUNN diode that give rise to negative resistance? [8]

b) Draw the equivalent circuit of parametric amplifier and explain the parametric involved. [7]

8 a) Explain the procedure for measuring VSWR<10. [8]

b) Explain the procedure for measuring attenuation with neat diagram. [7]