

Code No: **R32042****R10****Set No. 1****III B.Tech II Semester Supplementary Examinations, November - 2018****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) Based on Maxwell's equations, derive the field equations and prove that TEM wave cannot exist in Rectangular Wave Guide? [10M]  
b) A rectangular Wave guide with dimensions of 3cm X 2cm operate in the  $TM_{11}$  mode at 10 GHz. Determine the characteristics Wave impedance. [5M]
- 2 a) Derive 'fr' of a dominant mode in Rectangular Cavity? [8M]  
b) A cavity resonator with dimensions  $a=2\text{cm}$   $b=1\text{ cm}$  is excited by  $TE_{101}$  mode of 20 GHz. Calculate the length of the cavity. [7M]
- 3 a) What is the purpose of microwave attenuator? Explain various microwave attenuators. [8M]  
b) Prove that H-Plane Tee acts as a 3db coupler? [7M]
- 4 a) Discuss about Isolator and Gyrator. [8M]  
b) Explain the operation of a circulator and write its applications. [7M]
- 5 a) Prove that the bunching parameter is  $X=1.84$  for a 2-cavity Klystron amplifier. [8M]  
b) Explain the working principle of a Reflex Klystron Oscillator? [7M]
- 6 a) A helical TWT has diameter of 2 mm with 50 turns per cm. Calculate axial phase velocity and the anode voltage at which the TWT can be operated for useful gain. [8M]  
b) An X-band pulsed cylindrical magnetron has  $V_0 = 30\text{Kv}$ ,  $I_0 = 80\text{ A}$ ,  $B_0 = 0.01\text{ Wb/sq.m}$ ,  $\alpha = 4\text{ cm}$ ,  $b = 8\text{ cm}$ . Calculate i) Cyclotron angular Frequency, ii) cut-off voltage and iii) cut-off magnetic flux density. [7M]
- 7 a) Explain the basic principle behind Gunn diode. [8M]  
b) Explain the operation of IMPATT Diode [7M]
- 8 Using microwave test bench setup, Explain the measurement of [15M]  
i) Power ii) Q-factor.

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