6E6051

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B.Tech. VI Semester (Main/Back) Examination, April/May - 2017

Electronics & Communication Engg.

6EC1A Microwave Engg. - II

Time : 3 Hours **Maximum Marks : 80**

Min. Passing Marks : 26

Instructions to Candidates:

*Attempt any **five questions**, selecting **one question** from **each unit**. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitable be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

Unit - I

1. a) Discuss the Lumped Element for MICs and MMICs with proper diagram. **(8)**

   b) Discuss Impedance matching with Lumped (L-Networks) elements. **(8)**

OR

1. a) Discuss single stub tuning in microstrip circuit using shunt stub. **(8)**

   b) Discuss single section quarter wave transformer. **(8)**

Unit - II

2. a) Explain the following Detector Diodes with neat and clean diagram. **(8)**

   i) Silicon Crystal Diode.

   ii) Schottky Diode.

   b) Explain the equivalent circuit and characteristic of PIN Diode. **(8)**

OR

2. a) Explain the Gunn Effect in Gunn Diode also explain two valley model in Gunn diode with diagram. **(8)**

   b) Explain IMPATT Diode with its characteristics, negative Resistance, output power and efficiency. **(8)**

Unit - III

3. a) Explain the principle of operation of n-channel JFET with neat and clean diagram. **(8)**

b) A si n-p-n bipolar transistor has the following Parameters. **(8)**

Collector current Ic = 6mA

Common emitter current gain factor $h_{FE} = 120$

Operational temperature T = 300°K

Cross-sectional Area $W_D = 10^{-8}$ cm^2.

Then compute :

i) a mutual conductance gm.

ii) The input conductance g_b and resistance R_i.

iii) The electron diffusion coefficient D_n.

iv) The Diffusion capacitance C_{be}.

OR

3. a) Explain the Basic structure and principle of operation of MESFET. **(8)**

b) Explain the single stage FET Amplifier in detail. **(8)**

Unit - IV

4. a) Explain the bunching process. Derive the expression for the induced current in the catcher cavity for two cavity klystron. **(8)**

b) Describe the construction of Reflex klystron and explain how its is work as an oscillator? **(8)**

OR

4. a) Explain Mechanism of oscillations of Magnetrons oscillator? Also explain voltage tunable magnetron. **(8)**

b) A Frequency agile coaxial Magnetron has the following operation parameters. **(8)**

Pulse duration $\tau = 0.25, 0.50, 1.0$ µsec.

Duty cycle Dc = 0.001

Pulse on target N = 16 per scan.

Compute the following

i) Agile excursion

ii) Pulse to pulse frequency separation.

iii) Signal frequency.

iv) Time for N pulses.

v) Agile Rate.

Unit - V

5. a) Describe the mechanism of velocity modulation in a two cavity Klystron and hence obtain an expression for the bunched beam current. Also find out condition for maximum power output. **(8)**

b) A two cavity klystron amplifier has the following **(8)**

Parameter, $V_0 = 1000V$.

$R_0 = 40k\Omega$

$I_0 = 25mA$

$f = 3$ GHz,

Gap spacing in both cavity d = 1 mm. Spacing between the two cavity L=4cm Effective shunt Impedance Excluding beam loading R&h = 30kΩ determine.

i) Input gap voltage to give max. voltage V_2.

ii) Voltage gain, neglecting the beam loading in output cavity.

iii) Efficiency of Amplifier.

iv) Beam loading conductance and Show that neglecting it was justified in the proceeding calculation.

OR

5. a) Explain the wave modes of helix type travelling wave tube and show that output Power gain of TWT is AP = –9.54 + 47.3 μc dB. **(8)**

b) Explain with a neat diagram how TWT is used as microwave amplifier. **(8)**

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