6E 6051

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6E6051

B.Tech. VI Semester (Main) Examination, May - June 2015

Electronics And Communication Engg.

6EC1A Microwave Engg. - II

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

Min. Passing Marks : 24

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 suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

Use of following supporting material is permitted during examination.

1. Smith Chart

Unit - I

1. a) Discuss the printed inductors and capacitor. **(6)**

   b) Match a load impedance of $Z_L = 100+j\,80$ to a $50\,\Omega$ line using a single series open-circuit stub, Assuming that the load is matched at 2GHz, And that the load consists of a resistor and inductor in series, plot the reflection coefficient magnitude from 1GHz to 3 GHz. **(10)**

OR

1. a) Explain single section quaster-wave transformer. **(6)**

   b) A load impedance $Z_L = 200+j160\,\Omega$ is to be matched to a $100\,\Omega$ line using a single shunt-stub tuner.Find two solutions using open - circuited stubs. **(10)**

Unit - II

2. a) Explain with suitable sketch the construction, working and application of a varactor diode. **(8)**

   b) A low-level point contact detector diode has R_j=2 ohms, R_s = 5 ohms and C_j = 0.5 pf. Calculate the power loss in dB for operation at 5 GHz. **(8)**

OR

2. a) Explain the Gunn effect and principle of operation of Gunn diode. **(8)**

   b) An IMPATT diode with nominal frequency 10GHz, has $C_j = 0.5$pf, Lp =0.5nH and Cp = 0.3 pF at breakdown bias of 80v and bias current 80mA. The RF peak current is 0.65A for $R_d = -2$ ohm. Find

   i) The resonant frequency of oscillation. **(8)**

   ii) The efficiency.

Unit - III

3. a) Explain the geometry of silicon bipolar transistor and microwave equivalent circuit with its characteristics. **(8)**

   b) A Si microwave transistor has reactance of 1 ohm, transit time cut-off frequency of 4GHz, maximum E - field 1.6×10^5 v/m and saturation drift velocity 4×10^5 m/s. Determine the maximum allowable power. **(8)**

OR

3. a) Explain the principles of operation and small signal equivalent circuit of MESFET. **(8)**

   b) Derive the expression for transducer gain with unilateral transistor. **(8)**

Unit - IV

4. a) Describe the mechanism of operation and modes of oscillation for reflex klystron. **(8)**

   b) A reflex klystron is operated at 9GHz with a dc beam voltage of 600v for $1^{3/4}$ mode, repeller space length of 1 mm, and dc beam current of 10mA. The beam coupling coefficient is assumed to be 1. Calculate the repeller voltage electronic efficiency and output power. **(8)**

OR

4. a) Explain the resonant mode, Operation and mechanism of oscillations of cavity magnetron. **(8)**

   b) A pulsed cylindrical magnetron is operated with the following parameters.

   Anode Voltage = 25kV

   Calculate:

   a) The angular frequency

   b) The cutoff voltage **(2+3+3=8)**

   c) the cutoff magnetic flux density

Unit - V

5. a) Discuss the basic schematic and mechanism of operation of two cavity klystron amplifier. **(8)**

b) A two - cavity klystron amplifier is operated with a beam voltage of 3kV of the coupling coefficient is 0.9 and the magnitude of the signal voltage at the input cavity gap is 100v, find the velocities of the electrons leaving the input gap. **(8)**

OR

5. a) Draw the basic schematic of helix type TWT tube and explain its operation. **(8)**

b) A helix travelling-wave tube operates at 4 GHz under a beam voltage of 10kV and beam current of 500mA. If the helix impedance is 25 ohms and the interaction length is 20cm. find the output power gain in dB. **(8)**