Q.P. Code : **1722**

(3 Hours) [Total Marks :100

N.B. : (1) Question **No. 1** is **compulsory**.
(2) Answer any **four** out of remaining **six** questions.
(3) Assume suitable data wherever required but justify the same.

1. (a) State all four kuroda's identifies. 5
   (b) A typical PCB substract has a dietictic constant of 4.3 and loss factor of 0.02 at 6 GHz. Find the conductivity of the substract. 5
   (c) Define VSWR, reflection coefficien and characteristic Impedance. 5
   (d) Draw an equivalet circuit of two wire transmission line. Derive the expression for voltage and current travelling wave. 5

2. (a) Explain with equivalint circuits the RF behaviour of resistor and capacitor. 10
   (b) A transmission line of characteristic impedance $Z_o = 50 \, \Omega$ and length $0.2 \, \lambda$ is terminated in a load impedance $Z_L = 25 + j \, 30 \, \Omega$. Find the reflection coefficient, VSWR and input impedance by using smith cnart. 10

3. (a) Derive expressions for internal, external and loaded quality factors for the standard series and paralledl resonance circuits. 10
   (b) Explain schottky contact divde with cross sectional view and circuit model. 10

4. (a) For a parallel plate (copper) transmission lins operating at 1GHz. the following parameter are given $w = 6 \, \text{mm}$, $d = 1 \, \text{mm}$, $\varepsilon_r = 2.25$
   $\sigma_{diel} = 0.125 \, \text{mS/m}$ $\sigma_{cu} = 64.5 \, 16 \times 10^6 \, \text{S/m}$
   Find line parameters R, L, C and G per unit length 10
   (b) Discuss power consideration in transmission lines when 10
       (i) Source and load impedances are matched.
       (ii) Load impedance is matched and source impedance is not matched.

5. (a) Design a Butterworth Low pass filter having a cutoff frequency of 250MHz and attenuation of 15dB at 300 MHz. 10
   (b) Show the RF small signal model of BJT and equivalent model using miller effect. Find the value of C_{m1} and C_{m2} in terms of C_{cb}, V_{be} and V_{ce} 10

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6. (a) Explain construction and functionality of HEMT.   10

   (b) An abrupt p-n junction made of silicon has the acceptor and donor   10
concentration of $N_A = 10^{18}$ and $N_D = 5 \times 10^{15}$ cm^{-3} respectively. Assuming
that the device is at room temperature.

    (i). barrier voltage

    (ii) the space charge width in p and n type semiconductors.

7. Write short notes on   20

   (a) Microstrip transmission line

   (b) Chip resistor, capacitor and inductors.

   (c) Measurement of AC parameters.

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