T.E. / E.T. / Sem-V / R.F.C.D. 28/11/14

(OLD COURSE) QP Code : **12073**

(3 Hours) **[Total Marks : 100**

N.B. : (1) Question **No. 1** is **compulsary.**
(2) Answer any **4** out of remaining **six** questions.
(3) Assume suitable data wherever required but justify the same.
(4) Figure to the right indicates full marks.

1. (a) Explain the current flow in pn junction & give the expression for Idiff in terms of diffusion constant & Vdiff in terms of doping concentration. **5**

(b) Define VSWR, reflection coefficient & characteristic impedance. **5**

(c) A typical substrate has a dielectric constant of 4.3 & loss factor of 0.02 at 6 GHz. find the conductivity of the substrate. **5**

(d) Show that the maximum value of normalized resistance is numerically equal to the voltage standing wave ratio i.e. γ max = ρ. **5**

2. (a) A transmission line of characteristic impedance $Z_o = 50\ \Omega$ & length $0.2\ \lambda$ is terminated in a load impedance $Z_L = 25 + j\ 30\ \Omega$. Find the reflection coefficient, VSWR & i/p impedance by using smith chart. **10**

(b) Starting from definition of time-averaed power, obtain expression for the power absorbed by the load for lossless and lossy transmission line. **10**

3. (a) Explain with equivalen circuits the RF behavious of resistor, capacitor & inductor. **10**

(b) Explain schottky contact with the help of energy band diagram for **10**
(i) Metal & semiconductor do ont interact
(ii) Metal semiconductor contact.

4. (a) Design a buterworth lowpass filter having a cut-off frequency of 250MHz & attenuation of 15 dB at 300 MHz. **10**

(b) Explain the design procedure of small signal BJT amplifier (PC circuit design & RF circucuit design). **10**

5. (a) Explain construction and functionality of HEMT **10**
(b) A short circuited 50 Ω transmission line section is operated at 1GHz & possesses a phase velocity of 35% of the speed of light. Use both the analytical & smitch chart approach to determine the shortest lengths required to obtain on 4.7nH inductor. **10**

Correction attached