GANPAT UNIVERSITY
M. TECH SEM- II (EC) REGULAR EXAMINATION– APRIL-JUNE 2015
3EC205 Elective- I RF Circuits and Systems

TIME: 3 HRS   **TOTAL MARKS: 60**

Instructions: (1) This Question paper has two sections. Attempt each section in separate answer book.
                  (2) Figures on right indicate marks.
                  (3) Be precise and to the point in answering the descriptive questions.

SECTION: I

Q.1A Prove with required equations that if X1 and X2 are inductors and X3 are capacitor in common Emitter BJT then resulting circuit will be Hartley oscillator. Also write equations of frequency of oscillation for Colpitts and Hartley oscillator.   **(5)**

B Discuss about Balanced amplifier with all necessary equations.   **(5)**

OR

Q. 1A Discuss Manley-Rowe relations for reactive diode multipliers with suitable equations.   **(5)**

B Prove with required equations that if X1 and X2 are capacitors and X3 are inductor in common Emitter BJT then resulting circuit will be Colpitt oscillator. Also write equations of frequency of oscillation for Colpitts and Hartley oscillator.   **(5)**

Q.2A Discuss about design for maximum gain of a single stage amplifier.   **(5)**

B With equations describe about single ended Diode mixer circuits.   **(5)**

OR

Q.2A Write short notes on Balanced Mixer circuits.   **(5)**

B Discuss in detail about Oscillator phase noise concept.   **(5)**

Q.3A Write short note on Oscillator phase noise and dielectric resonator oscillator.   **(5)**

B Write short note on Microwave Sensors.   **(5)**

SECTION: II

Q.4A An X band amplifier has a gain of 20 dB and a 1GHz bandwidth. Its equivalent noise temperature is to be measured via Y factor method. These data have been obtained, for T1= 2900K, N1 = -62 dBm and T2= 770K ,N2= - 64.7dBm. Determine the equivalent noise temperature of the amplifier. If amplifier is used with a source having a equivalent noise temperature of TS = 450°K, What is the output noise power in dBm ?   **(5)**

B Discuss about Y factor method for measuring the equivalent noise temperature of an amplifier.   **(5)**

OR

Q.4 A Discuss about Low noise amplifier design with suitable equations.   **(5)**

B Discuss about noise figure of a passive two –port network in detail   **(5)**

Q.5A Derive equations for overall noise figure of a multistage -stage cascaded system.   **(5)**

B In detail discuss about broadband transistor based microwave amplifiers.   **(5)**

OR

Q.5A Discuss about both tests for unconditional stability in microwave amplifier design.   **(5)**

B The S parameters for HP HFET-102 GaAs FET at 2GHz with a bias voltage Vgs =0 are S11=0.894∠ -60.6,S12=0.020,∠ 62.4,S21=3.122∠ 123.6and S22=0.781∠ - 27.6.Z0=50 Ω. Find the stability of this transistor with K-Δ and μ test values. Also find values for centers and radii of the stability circles.   **(5)**

Q.6A Write short notes on Passive Intermodulation and Dynamic ranges of active RF components.   **(5)**

B Write short notes on PIN diodes as control circuits.   **(5)**

---**END OF PAPER**---

The Smith Chart

RADIALLY SCALED PARAMETERS