# GUJARAT TECHNOLOGICAL UNIVERSITY
## PDDC - SEMESTER–IV • EXAMINATION – WINTER 2013

**Subject Code: X41103**          **Date: 07-12-2013**

**Subject Name: Integrated Circuits and Applications**

**Time: 02.30 pm - 05.00 pm**          **Total Marks: 70**

**Instructions:**
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

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|---|---|---|---|
| **Q.1** | **(a)** | Derive the equations of gain, input resistance, output resistance, bandwidth and total output offset voltage with feedback for voltage series feedback amplifier. | **07** |
| | **(b)** | Draw and explain basic block diagram of op-amp and list out ideal characteristics of op-amp | **07** |
| **Q.2** | **(a)** | The 741c op-amp having following parameters is connected as a noninverting amplifier with $R_1$= 1.5kohm and $R_F$=15kohm: A=200000, $R_i$=2Mohm, $R_o$=75ohm, $f_o$=5Hz, supply voltage= +/-15V, output voltage swing=+/-13V. Compute the values of $A_F$, $R_{iF}$, $R_{oF}$, $f_F$, and $V_{ooT}$ | **07** |
| | **(b)** | Explain summing, scaling and averaging amplifier in detail | **07** |
| | | **OR** | |
| | **(b)** | Explain instrumentation amplifier in brief and derive equation of output voltage for instrumentation amplifier using transducer bridge | **07** |
| **Q.3** | **(a)** | Explain differential input and differential output amplifier in detail | **07** |
| | **(b)** | Explain integrator in detail | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Explain square wave generator using op-amp in detail | **07** |
| | **(b)** | Explain differentiator in detail | **07** |
| **Q.4** | **(a)** | Explain schmitt trigger in detail | **07** |
| | **(b)** | Explain absolute-value output circuit in detail | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | Explain peak clamper circuit in detail | **07** |
| | **(b)** | Explain sample-and-hold circuit in detail | **07** |
| **Q.5** | **(a)** | Explain 555 timer as a monostable multivibrator in detail | **07** |
| | **(b)** | Explain phase-locked loop with block diagram and operating principle | **07** |
| | | **OR** | |
| **Q.5** | **(a)** | Explain biquad circuit in detail. Also explain orthogonally tuned property of the biquad circuit | **07** |
| | **(b)** | Design a bandpass filter with a center frequency at $\omega_o$=1000 rad/s, a bandwidth of 200 rad/s, and maximum gain of 1, using the biquad circuit. | **07** |

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