B.E. / B.Tech. (Instrumentation Engineering) Model Curriculum Semester-IV

# IN405M - Linear Integrated Circuits

P. Pages : 2 **GUG/W/24/14018**

Time : Three Hours * 5 5 5 9 * Max. Marks : 80

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Notes : 1. Same answer book must be used for each section.
2. All questions carry marks as indicated.
3. Due credit will be given to neatness and adequate dimensions.
4. Illustrate your answers wherever necessary with the help of neat sketches.

**1.** a) What is difference between ideal and practical characteristics of op-amp? Describe various practical characteristics of op-amp? **8**

b) Derive the equations for voltage gain, input resistance and output resistance of dual input and balanced output differential amplifier by AC analysis. **8**

**OR**

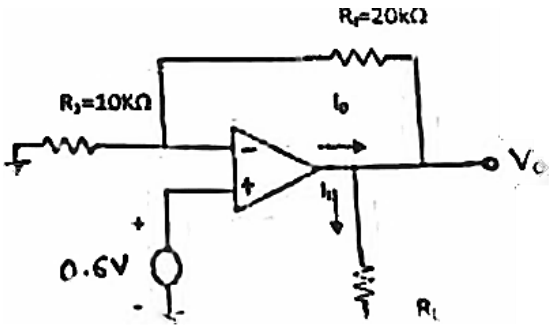
**2.** a) For dual input balanced output differential amplifier with swamping emitter resister following specification are given below $R_C = 2.2K\Omega, R_E = 4.7K\Omega, R_E^{'} = 100K\Omega,$ $V_{cc} = 10V, V_{EE} = -10\,V$, the transistor used have $V_{BE} = 0.7\,V$ and $\beta_{ac} = \beta_{dc} = 100$. Determine (1) Operating point of transistor (2) Voltage gain (3) input and output resistance. **8**

b) Draw the circuit diagram of different level shifter and explain its function. **8**

**3.** a) For a non-inverting amplifier shown in figure below, determine **8**

(a) $A_v$ (b) $V_o$

(c) $I_L$ (d) $I_o$




b) Draw and explain the circuit diagram of antilog amplifier & derive its output equation? **8**

**OR**

**4.** a) Explain briefly instrumentation amplifier and derive the output voltage. **8**

b) Draw circuit diagram of V/I converter (floating load and grounded load) and find out the output expression. **8**

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| **5.** | a) | With neat circuit diagram, explain the RC phase shift oscillator and derive an expression for its frequency of oscillation. | **8** |
| | b) | Explain the second order low pass filter in detail, design a second order low pass filter at a high cut off frequency of 1 kHz. | **8** |

**OR**

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| **6.** | a) | Draw the circuit diagram of all pass filter and obtain its gain expression. | **8** |
| | b) | State the advantages of active filters over passive filters. | **8** |
| **7.** | a) | Explain sample and hold circuit with diagram. | **8** |
| | b) | Explain the working of a D/A convertor using op-amp with R-2R ladder network. | **8** |

**OR**

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| **8.** | a) | Explain zero crossing detectors and its application. | **8** |
| | b) | Explain full wave precision rectifier using op-amp with the help of waveform and derivation. | **8** |
| **9.** | a) | List important features of IC-555 timer? Discuss the working of IC-555 with neat sketch. | **8** |
| | b) | Design a square waveform generator of frequency 100 Hz and duty cycle of 75%. | **8** |

**OR**

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|---|---|---|---|
| **10.** | a) | Differentiate between series and switching regulation. | **8** |
| | b) | Write short note on: | **8** |
| | | i) Astable multivibrator using IC 555. | |
| | | ii) Adjustable regulator using 78xx. | |

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