Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
A Constituent Institution of Manipal University

V SEMESTER B.Tech. (BME) DEGREE END SEM EXAMINATIONS NOV/DEC 2016

SUBJECT: INTEGRATED CIRCUIT SYSTEMS (BME 305)
(REVISED CREDIT SYSTEM)
Tuesday, 29th November, 2016, 2 to 5 pm.

TIME: 3 HOURS **MAX. MARKS: 100**

Instructions to Candidates:

1. **Answer any FIVE full questions.**
2. **Draw labeled diagram wherever necessary**

1A) Draw the circuit of a differential amplifier and explain its operation. Derive the expression of CMRR in terms of h parameters. **(8)**

1B) For the circuit shown in Fig. Q1B, if $R_i = \infty$, Show that the output admittance, **(6)**

$$Yof = \frac{1}{R+R^1} + \frac{1}{R_o}\left[1 - A_V \frac{R}{R+R^1}\right]$$

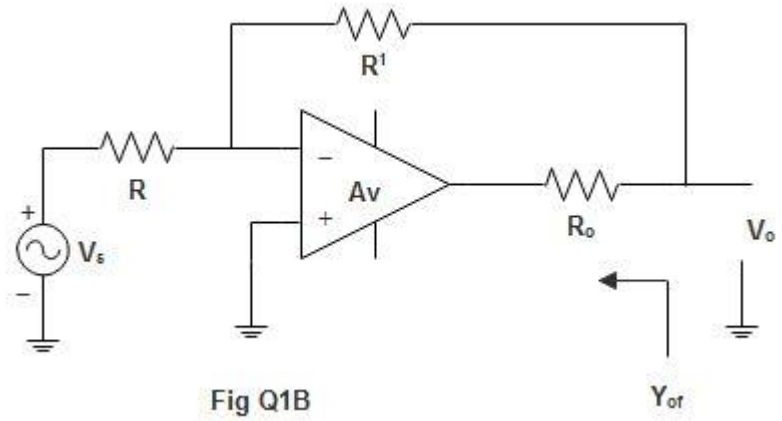

Fig Q1B

1C) List the characteristics of an Op Amp and define, (i) Input offset voltage (ii) Input offset current (ii) Power supply rejection ratio (iv) Slew rate **(6)**

2A) Draw the circuit of an instrumentation amplifier suitable for amplifying EEG signals. Explain its operation and derive the expression of the gain of the circuit. Calculate the component values to obtain a gain of 10000. **(8)**

2B) Draw the circuit of a logarithmic amplifier using Op-Amp with temperature compensation. Explain its operation and obtain the relation of the output. **(6)**

2C) What is a sample and hold circuit? With the suitable diagram and waveforms explain a sample and hold circuit. **(6)**

3A) Draw the circuit of an astable multivibrator using Op-Amp. Explain its operation with waveforms and derive the expression of the time period T. **(8)**

3B) Design and draw a 3rd order active high pass Butterworth filter for the following specifications. The lower cutoff frequency is 500Hz. Given the factor of polynomial is **(6)**

$$(s+1)(s^2+s+1)$$

3C) What is a delay equalizer? Draw the proto type of delay equalizer and obtain its transfer function. **(6)**

4A) Draw the circuit of a voltage to frequency converter using a timer IC. Explain its operation with waveforms and derive the expression of the output. **(8)**

4B) Draw the internal circuit diagram of timer IC. Explain the functions of each pin of the IC. **(6)**

4C) Design a square wave generator using timer IC for the following specifications. T=5 Seconds with a duty cycle of 20%. The output swing is 6 Volts. **(6)**

5A) Design and draw a regulated power supply circuit using IC 7805 for the following specifications. Output voltage can be varied between 6 volts to 9 volts. The power supply can handle a load current of 300 mAmp. The input to the power supply is 230 volts, 50Hz ac. Assume the ripple factor of the full wave bridge rectifier is 10%. **(8)**

5B) Give the block diagram of successive approximation type ADC and explain its operation **(6)**

5C) Write a note switching regulators. **(6)**

6A) Write the internal diagram of VCO IC566. Explain the operation with suitable waveforms and give the expression of frequency of output waveform fo. **(8)**

6B) Draw the circuit of a two phase dynamic MOS shift register. Explain its operation. **(6)**

6C) Write a note on Phase Locked Loops. **(6)**