Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

(A Constituent Institute of Manipal University)
Manipal – 576 104

V SEM B.TECH (BME) DEGREE MAKE UP EXAMINATIONS, DEC/JAN 2015-16

SUBJECT: INTEGRATED CIRCUIT SYSTEMS (BME 305)

(REVISED CREDIT SYSTEM)

Saturday, 2nd January 2016: 2 to 5 pm

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

Instructions to Candidates:

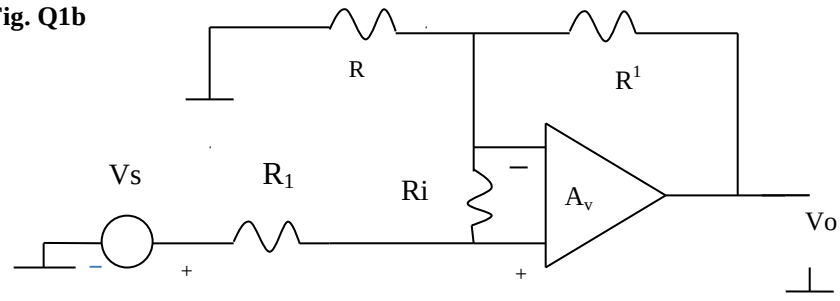
1. **Answer any FIVE full questions.**
2. **Draw labeled diagram wherever necessary**

Q1. (a) For a differential amplifier, obtain the expression of CMRR in terms of h-parameters. Mention the characteristics of an OP-Amp. 08

(b) For the circuit shown in fig. Q1b, show that 06

$$A_{vf} = \frac{V_o}{V_s} = \frac{-A_v R_i (R + R^1)}{RR^1 + (R_i + R_1)(R + R^1) - A_v RR_i}$$

Fig. Q1b



(c) Explain how the following parameters are measured practically for an Op-Amp. 06
(i) Input resistance. (ii) Output resistance.

Q2. (a) Design and draw the circuit of an instrumentation amplifier suitable to amplify the acquired ECG signals with an overall gain of 5000. Derive the expression of the output and find the values of each component. 08

(b) Draw the circuit of a practical integrator and explain its operation. Also derive the expressions of f_a and f_b 08

(c) Discuss about precision diode. Draw the circuit of a half wave precision rectifier and explain its operation with suitable waveforms. 04

Q3. (a) Design and draw a 3rd order active band pass Butterworth filter suitable to pass EMG signals between the frequencies of 400 Hz to 1KHz. The overall gain of the filter is 100. Given the factor of polynomial $P_n(s)$ is $(s+1)(s^2+s+1)$ 08

(b) Design and draw the circuit of a positive edge triggered Mono-stable Multi-vibrator using Op-Amp with t_P=1msec. Draw the relevant waveforms and explain the operation of the circuit. Also derive the expression of the pulse width. 08

(c) Write a note peak detector. 04

Q4. (a) Draw the circuit of a voltage to frequency converter using a timer IC. Explain its operation with suitable waveforms and derive the expression of the output frequency. 08

(b) Design and draw a suitable circuit using 555 IC for the following specifications. A red LED glow for 5 seconds and remain off for next 10 seconds. A green LED turns on at the instant red LED is turned off, and glow for 2 seconds. Assume V_{CC}=9V. 08

(c) Write a note switching regulators. 04

Q5. (a) Design a regulated power supply using IC LM317 for the following specifications. The output voltage can be varied between 9 volts to 14 volts at a maximum load current of 400 mA. The input is 230V, 50Hz AC. The required ripple factor of the capacitor filter is 8%. 08

(b) With a suitable block diagram discuss on VCO IC 566. 06

(c) With the suitable block diagram explain counter ramp type ADC and explain its operation and mention its merits and demerits. 06

Q6. (a) Draw the circuit of a 4 bit ladder type DAC and explain its operation. Derive the expression of the output. 08

(b) Draw the circuit of a bipolar RAM storage cell and explain its operation. 06

(c) Write a note phase locked loops. 06