Reg. No.										

INTERNATIONAL CENTRE FOR APPLIED SCIENCES

(Manipal University)

IV SEMESTER B.S. DEGREE EXAMINATION –MAY 2016

SUBJECT: IC SYSTEMS (EC 243)

20TH MAY, 2016

Time: 3 Hours **Max. Marks: 100**

- ✓ **Answer ANY FIVE Questions.**
- ✓ **Missing data may be suitably assumed.**

1A. Draw the circuit of emitter coupled differential amplifier. Derive expression for CMRR. Find the output voltage for the two DC input signals equal to 10μV & 20μV, if differntial gain is 10^5 & CMRR is infinity.

1B. Design a non-inverting amplifier using OPAMP to obtain the gain of 10. Derive expressions used using approximate analysis. Draw the input-output waveforms for (i) $V_i = \sin(31400t)$ (ii) $V_i = 1.5 + \sin(31400t)$ assuming supply voltage of ±12V.

(10+10)

2A. Explain with circuit diagram & relevant derivations application of OPAMP as integrator. Draw output waveform in both cases for input to be (i) DC of -2V, (ii) a square wave, 50% duty cycle & frequency 5kHz. Assume supply voltage of ±12V, Slew rate of OPAMP is 0.5V/μsec.

2B. Design a 5th order Butterworth high pass filter that eliminates signal upto 5kHz frequency and has pass band gain of 10. What will be the roll off rate in the stop band?

(10+10)

3A. Draw the internal diagram of IC NE/SE 565 and explain its working. Explain different frequency ranges.

3B. Design a circuit using OPAMP such that RED LED glows when the input DC lies between 0 to 4V, YELLOW LED glows when the input DC lies between 4V to 8V and GREEN LED glows when the input DC lies above 8V. Use supply voltage of ±12V. Explain its working.

(10+10)

4A. Explain the working of the circuit Fig. Q4A with waveforms & relevant derivations if switches (i) S_A and S_B open (ii) S_A closed and S_B open (iii) S_A open and S_B closed. Also give the name of the circuit in each case.

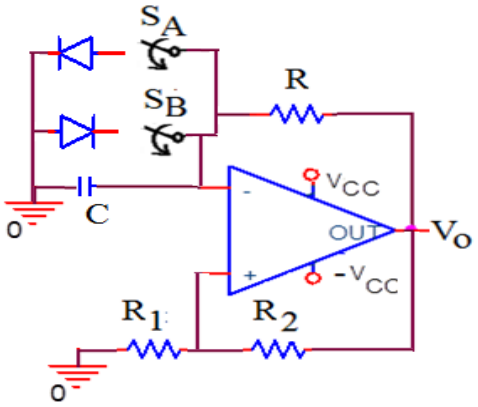

Fig. Q4A

4B. Draw the circuit of a monostable multivibrator using NE 555 timer. Derive the expression for monoshot time. Also explain how the circuit can be modified to get a ramp.

(10+10)

5A. Explain the working of an 8 bit ADC, using i) Flash type ADC ii) SAR type ADC with neat diagrams. What will be the conversion time in both cases if the digital output is 10000000 & clock frequency of 100kHz is used?

5B. Derive an expression for the output voltage for a 3-bit R-2R ladder network DAC with neat circuit diagram. Assuming the supply voltage of ±12V, b_2 acting as MSB input and b_0 acting as LSB input find output voltage if b_2=1, b_1=0, b_0=1 and R=1kΩ.

(10+10)

6A. Draw the circuit of voltage to current (V to I) converter with (i) Floating load (ii) Grounded load. Show in each case load current is proportional to the input voltage. Also find the value of R in the circuit shown in Fig. Q6A that produces 5mA load current.

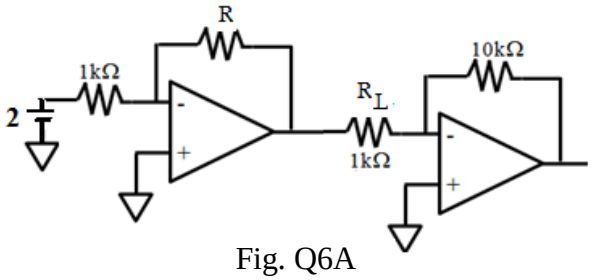

Fig. Q6A

6B. Design a circuit using OPAMP to obtain the output voltage (i) $V_0 = 6V_1 - 5V_2$ (ii) $V_0 = 6V_1 - 5V_2 + 8V_3 - 9V_4$ (iii) three input inverting average amplifier

(10+10)

7A. Explain with neat circuit diagram of log and antilog amplifier using OPAMP. Derive the expression for the output voltage in each case.

7B. Design a circuit that exhibits the transfer characteristic as shown in Fig. Q7B using OPAMP

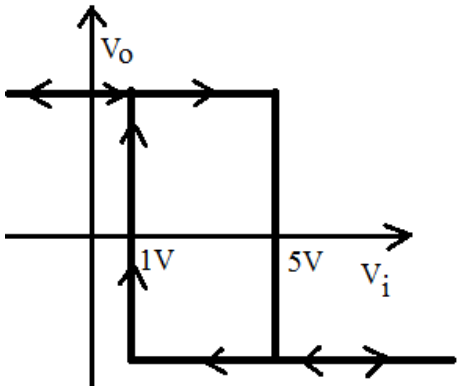

Fig. Q7B

(10+10)

8A. Design an adjustable voltage regulator using IC LM317 to get output voltage varying between 10V to 20V. Assume quiescent current I_Q=100μA.

8B. Write short notes on

(i) Differentiator using OPAMP
(ii) Constant current bias circuit

(10+10)