Reg. No.											

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

IV SEM B.Tech (BME) DEGREE MAKE-UP EXAMINATIONS, JUNE 2018.

SUBJECT: INTEGRATED CIRCUIT SYSTEMS (BME 2202)
(REVISED CREDIT SYSTEM)
Thursday, 14th June, 2018, 2 to 5 PM

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

Instructions to Candidates:

1. Answer ALL questions.
2. Draw labeled diagram wherever necessary

1A) Draw a differential amplifier circuit included with constant current source. Derive the expression of the constant current I_o. 6

1B) (i) List the characteristics of an ideal Op-Amp. 2+4

(ii) Design and draw the circuit using Op-Amp to obtain the following expression.

$V_o = 3V_1 + 1.5V_2 - 2V_3$

1C) Discuss on the temperature drift of input offset voltage and input offset current for an Op-Amp. An inverting Op-Amp amplifier has R_1=20KΩ and R_F=200KΩ. Assume the amplifier is nulled at 27^0C. Calculate the error voltage E_v and the output voltage at 40^0C with V_i=0.2V dc. Given, Input offset voltage drift is 30µV/ ^{0}C and input offset current drift is 300pA/ ^{0}C. 8

2A) Draw the circuit of an instrumentation amplifier suitable for amplifying the voltage from the bridge type of temperature transducer. Derive the expression of the output. 8

2B) The circuit shown in the Fig Q2B is a positive edge triggered mono-stable multi-vibrator. For this circuit draw the waveforms V_O and V_C with respect to the input waveform Vi. Calculate and label all the voltage levels of both waveforms and the pulse width t_P of V_O. 6

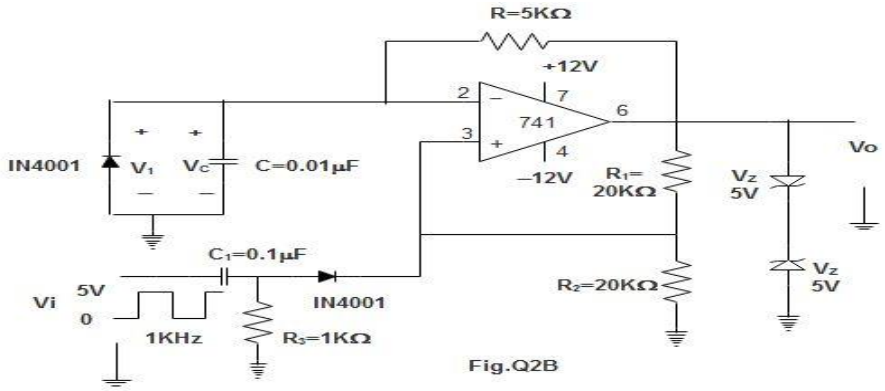

Fig.Q2B

2C) Design and draw an inverting Schmitt trigger circuit using Op-Amp with, UTP = 4V and LTP = –2V. Assume V_{CC} =±12 Volts. 6

3A) Design and draw a 4th order active low pass Butterworth filter suitable to pass ECG signals up to a frequency of 100 Hz. The overall gain of the filter is 100. Given the factor of polynomials Pn(s) is, $(s^2 + 0.675s + 1)(s^2 + 1.848s + 1)$ 8

3B) With the help of suitable block/circuit diagram explain how two signals V_{S1} and V_{S2} are multiplied? 6

3C) Write a note on delay Equalizer. 6

4A) Draw the pin diagram and internal diagram of timer IC 555. Explain the function of each pin of the IC. 6

4B) Design and draw the necessary circuit using timer IC to obtain the waveforms shown in Fig.Q4B. 8

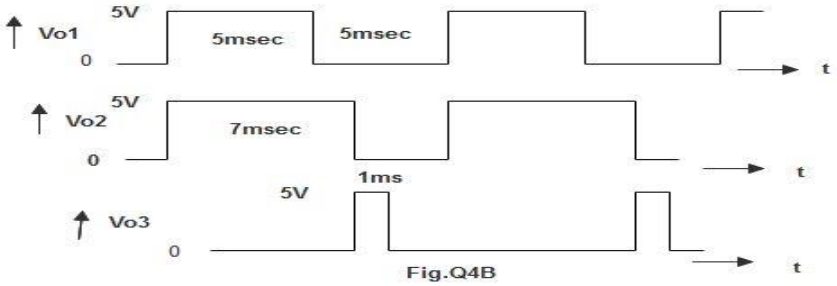

Fig.Q4B

4C) With a suitable circuit explain how a mono-pulse is generated using timer IC without using a trigger input? 6

5A) Design a regulated power supply for the following specifications. Output voltage can be varied between -10 volts to -15 volts. The maximum load current is 450 mA. Input is 230V, 50 Hz ac. Use a suitable regulator IC and other components. Assume a suitable ripple factor to design the filter capacitor of the full wave bridge rectifier. Obtain the appropriate specifications of the transformer to be used for this circuit. 8

5B) With a suitable block diagram explain the working of a successive approximation type ADC. 6

5C) Write a note on VCO IC 566. 6