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MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

FOURTH SEMESTER B.TECH. (ELECTRONICS & INSTRUMENTATION ENGG.)
ONLINE GRADE IMPROVEMENT/MAKE-UP EXAMINATIONS, AUGUST - 2021

SUBJECT: LINEAR INTEGRATED CIRCUITS [ICE 2254]

TIME: 2 HOURS 06-08-2021 **MAX.MARKS: 40**

Instructions to candidates: Answer any *FOUR FULL* questions.

Missing data may be suitably assumed.

1A. Explain the working of the non-ideal Op Amp circuit shown in Fig Q. 1A. Derive the expression for the gain. Given, R_1=3kΩ and R_2=20KΩ. Find out the gain for a=10^3 and a=10^4 and comment on your findings.

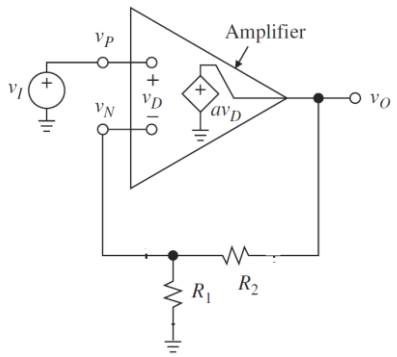

Fig.Q.1A

1B. Design a Temperature to Voltage converter that will measure temperatures between 25ºC and 50ºC. Given: Thermistor with characteristics given in Table Q.1B be used as transducer.

Table Q.1B

Temp. (°C)	R_{trans}
25	10,000
30	8,057
35	6,530
40	5,327
45	4,370
50	3,603

(4+6)

2A A 741C Op Amp with ±15V supply is configured as a noninverting amplifier with a gain of 10 V/V. (i) If the AC input amplitude is Vin = 0.5 V, what is the maximum frequency before the output distorts? (ii) If f = 10 kHz, what is the maximum value of Vin before the output distorts? (iii) If Vin = 40 mV, what is the useful frequency range of operation? (iv) If f = 2 kHz, what is the useful input amplitude range?

2B Design a wide bandpass filter with f_L = 200Hz and f_H = 1KHz and a passband gain = 4. Draw the frequency response plot of this filter and calculate its figure of merit.

(4+6)

3A Explain with a circuit schematic, working of a peak detector using Op Amp. Illustrate how can it be converted to a sample and hold circuit.

3B Explain the working of the circuit shown in Fig Q.3B if R_1=10KΩ, R_2=260KΩ, R_3=100KΩ. Sketch and comment on the output of the circuit for a 3V peak Sine wave as V_I.

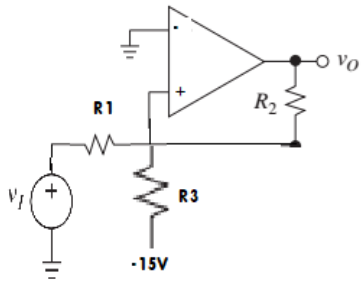

Fig.Q.3B

(4+6)

4A Derive an expression for the frequency of oscillation for a Wein Bridge oscillator and deduce the condition for obtaining sustained oscillations.

4B Design a circuit to generate square waveform with following specification. frequency 1 KHz, duty cycle 75%, amplitude excursion -5V to +5V. Available power supply is ± 15 V.

(5+5)

5A Using 555 timer design a circuit to work as a missing Pulse detector. Illustrate it's working.

5B A 4-bit weighted-resistor DAC is implemented with V_{REF} = −3.200 V and a high-quality Op Amp, but gross resistor values, namely, R_f =9kΩ instead of 10kΩ, 2R =22kΩ instead of 20kΩ, 4R =35kΩ instead of 40kΩ, 8R =50kΩ instead of 80kΩ, and 16R =250kΩ instead of 160kΩ. Find the gain error, along with the integral and differential nonlinearities.

(5+5)

6A Illustrate the working of a basic PLL with a block diagram.

6B Explain with relevant figures, construction and working of a switching regulator. Also list the advantages it offers over linear voltage regulators.

(4+6)

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