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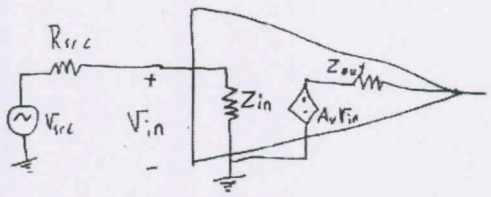
ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. / B. Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, APR / MAY 2025

B.E BIOMEDICAL ENGINEERING
IV SEMSTER
BM23S02 SKILL DEVELOPMENT COURSE – LEVEL II DESIGN AND DEVELOPMENT OF LAB PROTOTYPE FOR BIOMEDICAL APPLICATIONS
(Regulation 2023)

Time: 1.5 hrs. Max. Marks: 50

PART- A (3 Marks x 10 = 30 Marks)
(Answer all Questions)

Q. No.	Questions	Marks
1	Determine the output voltage of a differential amplifier for the input voltages of 250μV and 150μV. The differential gain of the amplifier is 3000 and the value of CMRR is 10000.	3
2	For the circuit given find the source resistance if Vs= 5 V, Zin= 1 Mohm and I =0.02mA . 	3
3	Calculate the Bandwidth from the tabulation. For vin=1mV.	3

Frequency (Hz)	V_{out} (mv)
1	15.3
2	21
3	31.72
5	39.25
10	45.65
50	45.75
75	45.6
100	45.3
500	45.88
1k	45.94
3k	46.13
5k	46.25
10k	46.9
60k	39.3
75k	35.4
100k	31.9

4	Design a potential divider circuit at the input stage of a preamplifier to get a 2 mv signal to a differential input. Choose the correct input value and source voltage accordingly.	3
5	What should be the ideal characteristics of Biopotential amplifier?	3
6	Design the ideal filter circuit to remove the common mode signals.	3
7	Calculate the Gain of a preamplifier using AD620 when its Rg= 2.2 K ohm.	3
8	If V out = 9V. I = 0.7 mA and Ro= 1 Kohm. Find the output impedance value.	3
9	Which microcontroller is best opted for continuous bio signal acquisition? Why?	3
10	In PCB design using software tools mention the steps to create a PCB layout from circuit.	3

PART- B (5 Marks x 4 = 20 Marks)

(Answer any 4 Questions)

Q. No.	Questions	Marks
I.	Design an ECG amplifier with the frequency of 02 Hz to 75 Hz and gain of 500. Choose the ideal stages to achieve gain and frequency.	5
II.	Design an ECG amplifier with a gain of 700. Choose the frequency of amplifier based on signal characteristics.	5
III.	Design a preamplifier for the gain of 40. Draw its tentative frequency response and find its gain, CMRR, input impedance and output impedance. Assume the current values for calculation.	5
IV.	Design an EMG amplifier with the frequency range of 15 to 600Hz and gain of 1500.	5
V.	Given that CMRR 100 dB. Input common mode voltage is 12V. Differential voltage gain is 4000. Calculate output common mode voltage.	5
VI.	Design the suitable level shifter circuit used for bio signals transmission from board to microcontroller.	5

CONTROLLER OF EXAMINATIONS ★ ADDITIONAL AU CHENNAI 600 025