

Con. 5482-09.

(REVISED COURSE)

SP-8573

(3 Hours)

[Total Marks : 100

- N.B. : (1) Question No. 1 is compulsory.
 (2) Attempt any four questions from remaining questions.
 (3) Figures to the right indicate full marks.
 (4) Make suitable assumptions wherever necessary.

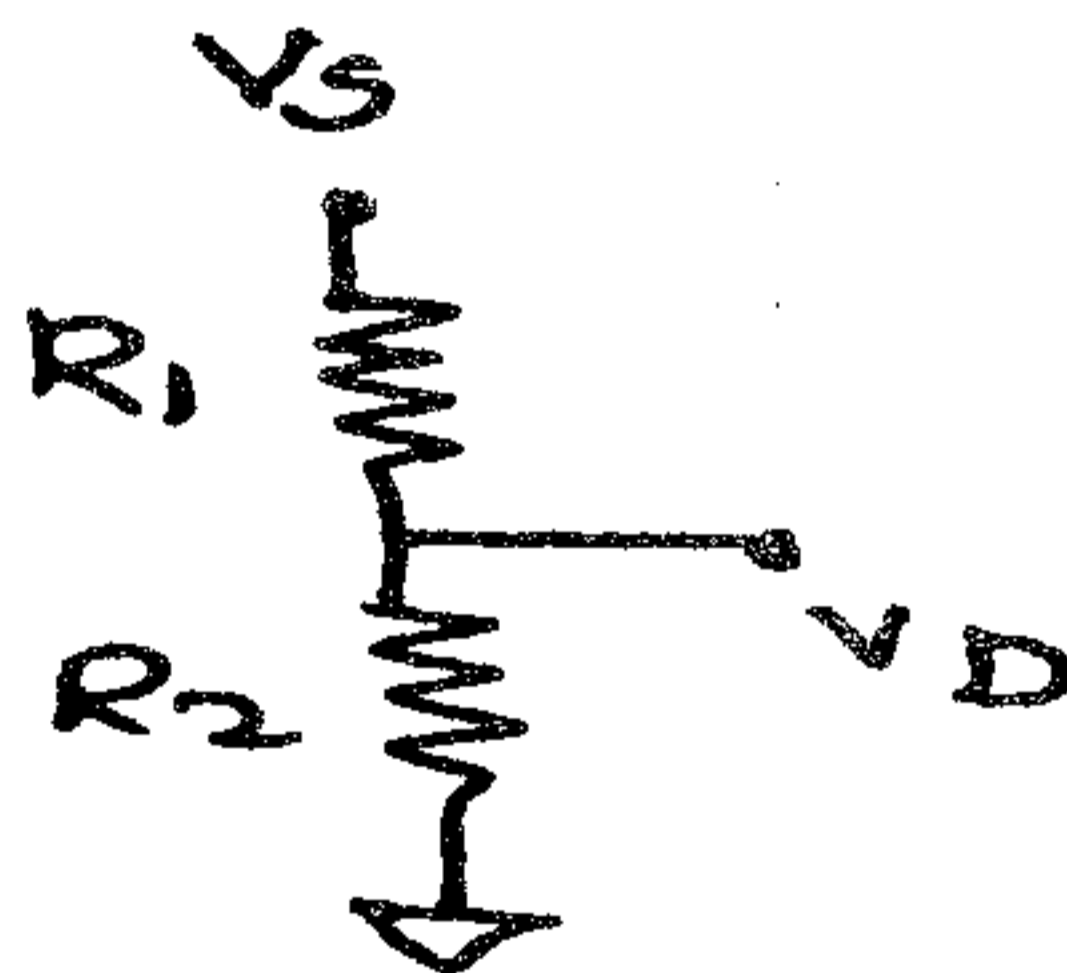
1. Attempt any four :-

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- (a) Why is R_e in an emitter coupled differential amplifier replaced by an constant current source ? Draw and explain such circuit.
 (b) What is the important of gain bandwidth product in inverting and non-inverting amplifier ?
 (c) What are the advantages of precision rectifier over traditional rectifier ?
 (d) Explain 'Temperature Stability' and 'Ripple Rejection'.
 (e) What are the state variable filter ? Why they are called as universal filter ?

2. (a) As shown in following figure $R_1 = 10 \text{ k } \Omega$ and $V_s = 5\text{V}$. Suppose R_2 is a 10 transducer whose resistance varies from $4 \text{ k } \Omega$ to $12 \text{ k } \Omega$.

- Find (i) Minimum and maximum value of V_o
 (ii) Output impedance
 (iii) Power dissipation by R_2 (Transducer).



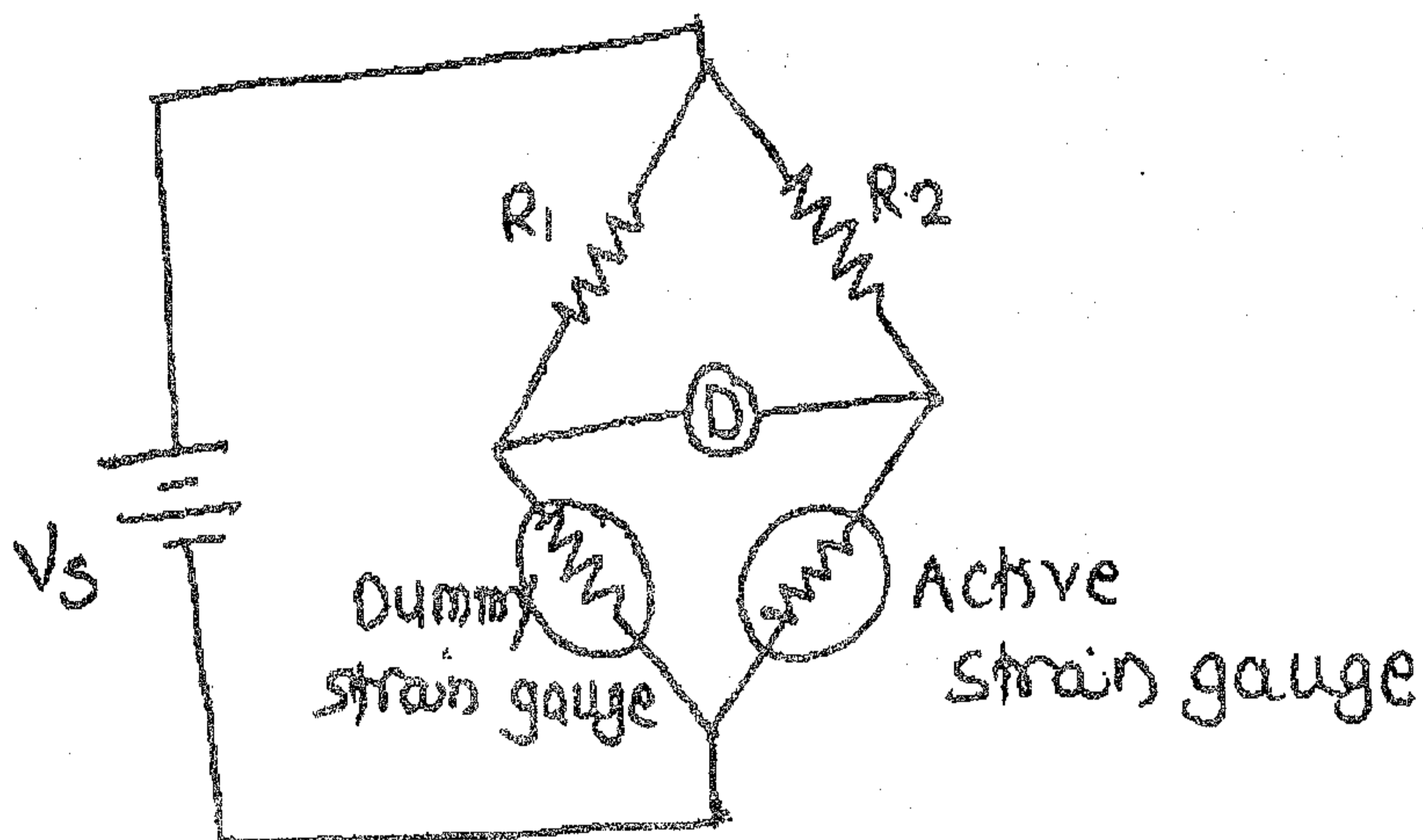
- (b) Explain the working of wein bridge oscillator using an op-amp with the help of neat circuit diagram. Derive the expression for the output frequency. 10
3. (a) What is an instrumentation amplifier ? Explain the working of a 3 op-amp instrument amplifier. 10
 (b) Design a low pass filter at a cutoff frequency of 10 kHz and passband gain 2. 10
4. (a) Draw the block diagram of an op-amp. List of the characteristics of an op-amp and give typical values of the same for IC 741. 10
 (b) Design a adjustable voltage regulator to satisfy the following specification 10 using IC LM317 –
 output voltage $V_o = 5\text{V to } 12\text{V}$
 output current $I_o = 1.0 \text{ Amp}$.

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5. (a) An RTD has $\alpha_0 = 0.005/^\circ\text{C}$, $R = 500 \Omega$ and a dissipation constant of $P_D = 30 \text{ mw}/^\circ\text{C}$ at 20°C . The RTD is used in bridge circuit with $R_1 = R_2 = 500 \Omega$ and R_3 is a variable resistor used to null the bridge, if the supply is 10 volts and RTD is placed in a bath at 0°C . Find the value of R_3 to null the bridge. 10
- (b) Draw a functional block diagram of LC 723 and discuss its operation. 10
6. (a) For an 8 bit R-2R DAC. Calculate the values of LSB, MSB and full scale output voltage for the range of 0 to 10 V. 10
- (b) Draw and explain integrator using op-amp. Also draw the frequency response of ideal and practical integrator. 10
7. (a) A strain gauge with a G.F. = 2.03 and $R = 350 \Omega$ is used in the bridge as shown in fig. The bridge resistors are $R_1 = R_2 = 350 \Omega$, and the dummy gauge has $R = 350 \Omega$. If a strain of $1450 \mu\text{m}/\text{m}$ is applied find the bridge offset voltage if $V_s = 10 \text{ V}$. 10



- (b) Explain the working of op-amp as – 10
- (i) Adder
 - (ii) Sample and Hold Circuit.