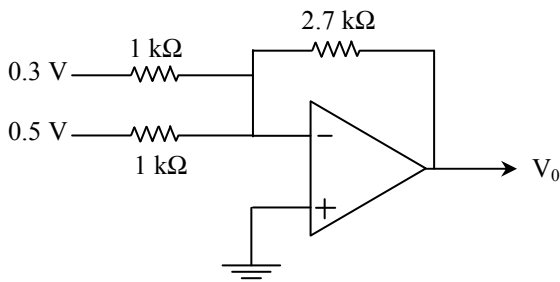


- Instructions :** (1) All Questions are Compulsory.
(2) Answer each next main Question on a new page.
(3) Illustrate your answers with neat sketches wherever necessary.
(4) Figures to the right indicate full marks.
(5) Use of Non-programmable Electronic Pocket Calculator is permissible.
(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

1. (a) Attempt any **SIX** of the following: [12]
- (i) Define (1) slew rate (2) CMRR
 - (ii) Draw the circuit diagram for subtractor using op-amp
 - (iii) How will you convert a comparator into a zero crossing detector ?
 - (iv) State the need of signal conditioning and signal processing.
 - (v) Draw the frequency response characteristics of band pass & band reject filter.
 - (vi) State the function of threshold & discharge pin of IC555.
 - (vii) State any 4 applications of PLL.
 - (viii) Explain the principle of sinusoidal oscillators with neat block diagram.
- (b) Attempt any **TWO** of the following: [8]
- (i) Draw dual input balanced output differential amplifier and describe the operation of it.
 - (ii) With the help of equivalent circuit of op-amp explain it's transfer characteristics.
 - (iii) Draw and explain block diagram of an op-amp
2. Attempt any **FOUR** of the following: [16]
- (a) Compare open loop and closed loop configuration of op-amp on following basis.
 - (i) Circuit diagram
 - (ii) Gain
 - (iii) Bandwidth
 - (iv) Application
 - (b) For the given circuit obtain the output voltage.



- (c) What are the drawback of ideal integrator and how they are overcome?
- (d) If $R_1 = 2 \text{ k}\Omega$, $R_F = 100 \text{ k}\Omega$, $v_{cc} = \pm 15 \text{ v}$ and rms input voltage $v_1 = 50 \text{ mV}$, calculate output voltage in inverting & non inverting mode.

- (e) With the circuit diagram explain op-amp as adder in inverting mode.
(f) Derive the expression for output voltage of basic differentiator.
3. Attempt any **FOUR** of the following: [16]
(a) Describe the operation of instrumentation amplifier using 3 op-amps with neat circuit diagram.
(b) Draw and explain the circuit of V to I converter using op-amp.
(c) Describe the operation of logarithmic amplifier with neat circuit diagram.
(d) Describe the operation of op-amp based schmitt trigger for sine to square wave conversion with the help of circuit diagram.
(e) Explain working of active positive peak detector with neat circuit and waveforms.
(f) Draw and explain sample and hold circuit using op-amp.
4. Attempt any **FOUR** of the following: [16]
(a) Compare active and passive filters.
(b) Design 1st order HPF (high pass filter) with cut off frequency of 10KHz with a passband gain of 1.5.
(c) Draw the second order high pass filter and describe its operation.
(d) Explain Narrow band reject filter with neat circuit diagram.
(e) Define following terms related to a filter.
(i) Pass band (ii) Stop band
(iii) Roll-off rates (iv) Q of a filter
(f) Draw the circuit diagram & waveforms for non-inverting comparator using op-amp.
5. Attempt any **FOUR** of the following: [16]
(a) Draw the functional block diagram of timer IC555. State the function of internal pnp transistor in IC555.
(b) Design a monostable for a pulse width of 10ms by using IC555.
(c) Draw circuit diagram of IC555 as water level controller. Explain its working.
(d) Draw the circuit diagram & waveforms of Bistable multivibrator using IC555.
(e) Explain operation of PLL as multiplier.
(f) Describe the operation of phase detector and role of VCO in PLL.
6. Attempt any **FOUR** of the following: [16]
(a) Describe the working of voltage controlled oscillator using IC555.
(b) Using IC741 draw and explain with neat circuit diagram wein bridge oscillator.
(c) Design a RC phase shift oscillator to get the oscillations at 2KHz.
(d) Explain Schmitt trigger operation using IC555.
(e) Draw and explain the operation of astable multivibrator using op-amp.
(f) Draw and explain square wave generator using IC555.

