22391

22223

3 Hours / 70 Marks Seat No. | | | | | | | | |

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) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following: **10**

a) Define the following terms w.r.t. amplifiers.

i) Voltage gain

ii) Bandwidth

b) Define active and passive transducers.

c) Define following parameters w.r.t. operational amplifiers.

i) Slew rate

ii) CMRR

d) State the Barkhausen's criterion for sustained oscillations.

e) Draw the block diagram of op-amp.

f) State the selection criteria of transducer.

g) State the output voltage range of the following IC voltage regulators.

i) IC 7810

ii) IC 7915

Marks

2. Attempt any FOUR of the following: **12**

a) State the ideal and practical values of following characteristics for op-amp IC 741.

i) Slew rate

ii) CMRR

iii) Input offset voltage

b) Explain working of double tuned amplifier with neat sketch.

c) Compare amplifier and oscillator.

d) Calculate the time period and frequency of oscillations for astable multivibrator with component values of RA = 4.7 KΩ, RB = 2.5 KΩ and C = 0.1 μF.

e) Compare RTD and thermistor w.r.t.

i) Working principle

ii) Material

iii) Cost

3. Attempt any FOUR of the following: **12**

a) A tuned circuit has a resonant frequency of 1 MHz. What will be the value of Q-factor if bandwidth is 25 KHz.

b) Draw the circuit diagram of V to I converter and state two applications of it.

c) Explain the working of Miller sweep generator with neat sketch and waveforms.

d) Explain the construction and working principle of LVDT.

e) Explain the working of schmitt trigger circuit using IC 555 timer.

4. Attempt any THREE of the following: **12**

a) Draw the circuit diagram of two stage RC coupled amplifier and draw its frequency response.

b) Explain the virtual ground concept of op-amp.

c) Compare RC phase shift oscillator and crystal oscillator.

d) Explain the construction and working principle of RTD. (PT-100)

e) Explain the working principle of monostable multivibrator using IC 555 with circuit diagram.

Marks

5. Attempt any THREE of the following: **12**

a) Compare single tuned and double tuned amplifier w.r.t.

i) Selectivity

ii) Q-factor

iii) Bandwidth

iv) Frequency response

b) Explain the operation of window detector.

c) Draw circuit diagram of wien bridge oscillator using op-amp and explain its working.

d) Draw and explain peak to peak detector.

e) Design and draw op-amp based circuit for getting,

$V_0 = 5V_1 - 5V_2 + 3V_3$

6. Attempt any TWO of the following: **12**

a) Draw a voltage level detector circuit. Draw its transfer characteristics for positive, negative and zero reference voltage.

b) Draw the Bootstrap sweep circuit and explain its working with waveforms.

c) A PLL using IC 565 has $R_1 = 15\ K\Omega$, $C_1 = 0.01\ \mu F$, $C_2 = 10\ \mu F$. Supply voltages are $\pm$ 12 V

Calculate,

i) Free running frequency (four)

ii) Lock range (F_L)

iii) Capture range (F_C)