SARDAR PATEL UNIVERSITY
T.Y.B.Sc. (VI Semester) Examination
Thursday, 15th July, 2021
10.00 am - 12.00 pm
US06CELE21-Discrete and Linear Circuits

Total Marks:70

Q 1 : Multiple Choice Questions: (10)

1. For ideal Op Amp CMRR should be
   - (i) Infinite
   - (ii) Zero
   - (iii) Very high
   - (iv) Constant quantity

2. Active filter have gain
   - (i) less than Unity
   - (ii) greater than unity
   - (iii) infinite
   - (iv) Equal to 1

3. A conventional ac voltmeter measures
   - (i) rms value of input signal.
   - (ii) peak value of input signal
   - (iii) average value of input signal.
   - (iv) None of the above

4. The time constant for Astable multivibrator is given by
   - (i) $RC \ln(1+2R_2/R_1)$
   - (ii) $RC \ln(1+2R_1/R_2)$
   - (iii) $RC \ln(R_1+R_2/2)$
   - (iv) $RC \ln(R_1+R_2)$

5. The cut in voltage for Si diode is
   - (i) 0.3 V
   - (ii) 0.7 V
   - (iii) 1.5 V
   - (iv) 1.0 V

6. The diode forward current is given by
   - (i) $I_f = I_O\left(e^{\frac{V_f}{nV_T}} -1 \right)$
   - (ii) $I_f = I_O\left(e^{\frac{V_f}{nV_T}} +1 \right)$
   - (iii) $I_f = I_O\left(\frac{e^{nV}}{V_f} -1 \right)$
   - (iv) None of above

7. In -------------------- carrier signal is square wave or pulses whose amplitude is varied by modulating signal.
    (i) Pulse frequency modulation
    (ii) Pulse width modulation
    (iii) Pulse amplitude modulation
    (iv) Pulse frequency and width modulation

8. Which transducer converts input form of signal to the charge?
    (i)   Thermistor
    (ii)   sensitor
    (iii)   Thermocouple
    (iv)   Amplifier

9. No triggering input is applied in -------- multivibrator.
    (i)   Astable
    (ii)   Monostable
    (iii) Bistable
    (iv) One shot

10. Timer 555 is an --------------IC used to produce delay of few microsecond to few minutes
    (i)   Digital
    (ii)   Analog
    (iii)   Both digital and Analog
    (iv)   All of the above

Q2: Fill in the blanks. (04)

(A)
1. Passive filter have gain ----------------------- unity.
2. Astable multivibrator is also called -------------------multivibrator.
3. The circuit which adds dc voltage to the ac input signal is called ---------
4. When VCO frequency and input signal frequency becomes equal than the PLL is said to be -----------------------------

Q2: True or False. (04)

(B)
1. The full form of OP-Amp is Operational Amplifier.
2. For rectification transistor is used.
3. The process known as signal compression is used with an log amplifier.
4. IC 555 timer operates in the temperature range -55 C to 125 C.

Q.3 Answer any <u>ten</u> questions briefly. (20)
1. State function of level shifter of Op-Amp.
2. What are the main requirements of output stage of Op-Amp.?
3. Explain briefly notch pass filter.
4. What are limitations of PN junction diode?
5. State applications of Monostable multivibrator.
6. Draw circuit for Monostable multivibrator using OP Amp.
7. Draw circuit of temperature compensated log amplifier.

8. What is expression for forward current of diode?
9. What is function of clipper circuit?
10. Give some salient features of timer 555.
11. Draw the pin diagram of 555 timer and label each pin?
12. State the types of multivibrator. Define any one multivibrator.

Q.4 **Long Answer question. (Answer any 4 out of 8)** .

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1. Draw block diagram of Op-Amp and discuss about each block.
2. Explain any two applications of non-inverting mode of Op-Amp.
3. Explain half wave and full wave rectifier using Op Amp.
4. Explain Astable multivibrator and obtain expression for total time period T.
5. Explain basic logarithmic amplifier and state its disadvantages
6. Explain analog voltage multiplier circuit using Op-Amp.
7. Draw functional block digram of 555 Timer and explain working of each block.
8. Explain how Astable multivibrator can be used for (i) square wave generator (ii) VCO.

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