GURU NANAK INSTITUTE OF TECHNOLOGY
An Autonomous Institute under MAKAUT
2020-2021
Analog Electronics Circuit(BACKLOG)
EI 301

TIME ALLOTTED: 3 HOURS   **FULL MARKS: 70**

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable

GROUP – A
(Multiple Choice Type Questions)

Answer any *ten* from the following, choosing the correct alternative of each question: **0×1=10**

			Marks	CO No

1. i) In typical circuits, the stabilization factor $S(\Delta I_C / \Delta I_{CO})$ is — 01 — CO1,CO3
   a) < 1
   b) >1
   c) =1
   d) <<1

   ii) Thermal runaway in a transistor is due to — 01 — CO1,CO3
   a) Heating of the transistor
   b) Changes in β which increases with temperature
   c) Increase in reverse voltage saturation current due to rise in temperature
   d) None of this

   iii) In an amplifier a coupling capacitor is used to — 01 — CO1, CO2
   a) Match the impedance
   b) Control frequency
   c) Limit bandwidth
   d) Prevent DC mixing with the output

   iv) A Zener voltage regulator will cease to act as a voltage regulator if Zener current becomes? — 01 — CO2
   a) less than the load current
   b) zero
   c) more than load current
   d) none of these

   v) The voltage gain of an emitter follower circuit is — 01 — CO1,CO3
   a. greater than 1
   b. equal to 1
   c. less than 1
   d. none of these

   vi) The gain required for the sustained oscillation in Wien Bridge oscillator is — 01 — CO1,CO3
   a) 29
   b) 1.5
   c) 3

d) 1

vii)	A differential amplifier is used at input stage of any operational amplifier to ensure	01	CO1,CO3	

a) High CMRR
b) Wide Bandwidth
c) High slew rate
d) High open loop gain

viii)	A V-I converter is a / an	01	CO1

a) Trans conductance amplifier
b) Trans resistance Amplifier
c) Current Amplifier
d) Operational Amplifier

ix)	output pulse width for a Monostable multivibrator using IC 555 where external resistance and capacitance are 20 KΩ and 0.1 µF is	01	CO1,CO4

a) 2.1 s
b) 2.2ms
c) 2.5 s
d) 2.2 µs

x)	An instrumentation amplifier is	01	CO1

a) A differential amplifier
b) Has a gain less than 1
c) Has very high output impedance
d) Has low CMRR

xi)	In VCO, the frequency is dependent on the value of	01	CO1,CO2

a) Resistance
b) Capacitance
c)Voltage
d) None of these

xii)	To avoid false triggering of the NE 555 timer, the RESET pin (pin 4) is generally connected to	01	CO1,CO2

a)Pin 8
b) pin 3
c)pin 1
d) no connection(NC)

GROUP – B
(Short Answer Type Questions)
Answer any *three* from the following: **3×5=15**

|			Marks	CO No
2.	a)	What is ripple factor?	1	CO4
	b)	How ripple can be eliminated from the output using shunt capacitor filter?	4	CO4
3.	a)	Define CMRR of Op-amp.	2	CO3
	b)	Design a multiplier circuit using Op-amp.	3	CO3

4.	a)	Explain the operation of class A power amplifier and obtain its maximum efficiency.	5	CO4
5.	a)	Draw the proper circuit diagram and explain the operation of logarithmic amplifier.	5	CO3
6.	a)	Design a circuit which will generate output with 50% duty cycle using 555 timer.	5	CO3

GROUP – C
(Short Answer Type Questions)
Answer any *three* from the following: **3×15=45**

			Marks	CO No
7.	a)	Draw the circuit of shunt voltage regulator and Explain its operation.	3	CO4
	b)	Draw the circuit of a self–bias transistor and derive the expression for stability factor $S=\frac{\partial I_C}{\partial I_{CO}}$. Obtain the value of 'S' for the above mentioned circuit with following specification: Vcc= 22.5 volt, R_L= 5.6 KΩ, R_E= 1 KΩ, R_1= 90 KΩ, R_2= 10 KΩ, V_{BE}=0.7 volt and β=55 assuming $I_b \gg I_{co.}$	8	CO1,CO2
	c)	Draw and explain the circuit which uses a diode to compensate for changes i) in V_{BE}, ii) in I_{CO}.	4	CO1
8.	a)	With a proper circuit diagram explain the operation of wien Bridge oscillator circuit.	8	CO1,CO4
	b)	In a phase shift oscillator $R_1=R_2=R_3$=800KΩ, $C_1=C_2=C_3$=100pF. Derive the expression for frequency of oscillation and calculate the value.	5	CO2
	c)	What are Burkhouse criteria for the oscillation?	2	CO1
9.	a)	Draw the circuit diagram of an astablemultivibrator using 555 timer and derive the expression of its frequency of oscillation.	5	CO1,CO4
	b)	For an Astable multivibrator using 555 timer, R_A = 6.8 Kohm, R_B = 3.3 Kohm and C=0.1µF, Calculate i) T_{high} ii) T_{low} iii)Free running frequency iv)Duty cycle D in %	5	CO2,CO4
	c)	Draw explain the operation of voltage shunt regulator circuit?	5	CO1
10.	a)	What are the criteria of a good instrumentation amplifier? Describe the steps for building an instrumentation amplifier starting from the basic differential amplifier. Describe precision full wave rectifier. How it is advantageous than normal rectifier circuit?	5	CO1,CO4
	b)	For the Adder circuit shown in Fig.1 find the output voltage.	4	CO1,CO2
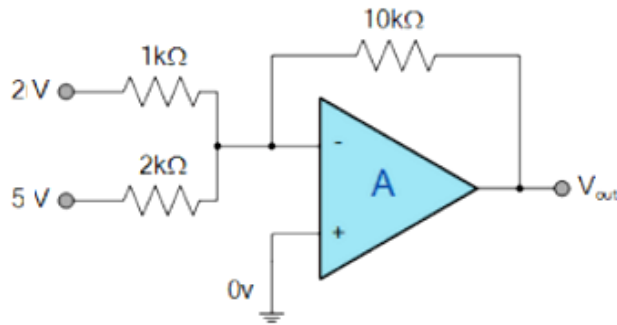
	c)	Obtain the expression for the output voltage of an integrator using Op-amp.	3	CO1,CO2
	d)	What do you mean by precision rectifier? Explain the operation of a half wave precision rectifier.	3	CO1
11.	a)	**Answer any 3 :**	**3*5=15**	CO1
		SMPS		
	b)	Crystal Oscillator	5	
	c)	Power amplifier	5	
	d)	Smith trigger	5	
	e)	Unbalanced and balance Differential Amplifier	5	