SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT
OF
ELECTRONICS AND INSTRUMENTATION ENGINEERING

QUESTION BANK

IV SEMESTER

EI3463 –Electronics for Analog signal Processing

Regulation – 2023

Academic Year: 2025-2026 (EVEN)

Prepared by

Dr.R.IssanRaj, M.E,Ph.D.
Assistant Professor (Sr.G) / EIE

SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203.

DEPARTMENT OF ELECTRONICS AND NSTRUMENTATION ENGINEERING

QUESTION BANK

SUBJECT : EI3463 –Electronics for Analog signal Processing
SEM / YEAR: IV / II

UNIT I OPERATIONAL AMPLIFIER CHARACTERISTICS
Introduction to Fabrication of integrated circuits, Functional block diagram and operation of Op-amp, Ideal Characteristics of Op-amp, DC Characteristics: Input bias current, Input offset current, Input offset voltage and Thermal drift, AC Characteristics: Frequency response, stability, frequency compensation, slew rate and methods of improving slew rate.

PART – A

Q.No	Questions	COs	BT Level	Competence
1.	Difference between monolithic and hybrid ICs.	**CO1**	**BTL-2**	**Understand**
2.	List the advantages of integrated circuits over discrete component circuits.	**CO1**	**BTL-2**	**Understand**
3.	Distinguish between dry etching and wet etching.	**CO1**	**BTL-2**	**Understand**
4.	List the steps used for preparation of silicon wafer.	**CO1**	**BTL-1**	**Remember**
5.	List the basic process used in IC fabrication.	**CO1**	**BTL-1**	**Remember**
6.	Point out the popular IC package configurations available.	**CO1**	**BTL-1**	**Remember**
7.	What is the value of open loop gain and output impedance of an ideal op-amp?	**CO1**	**BTL-1**	**Remember**
8.	What is an OP-Amp? Draw the circuit symbol of an OP-Amp.	**CO1**	**BTL-1**	**Remember**
9.	List out the ideal characteristics of an OP-AMP.	**CO1**	**BTL-1**	**Remember**
10.	Compare the ideal and practical op-amp characteristics.	**CO1**	**BTL-2**	**Understand**
11.	Write some applications of operational amplifier.	**CO1**	**BTL-1**	**Remember**
12.	Define virtual ground concept	**CO1**	**BTL-1**	**Remember**
13.	What do you mean by input offset current?	**CO1**	**BTL-1**	**Remember**
14.	What do you mean by offset voltage?	**CO1**	**BTL-1**	**Remember**
15.	Write about thermal drift in Op-amp.	**CO1**	**BTL-1**	**Remember**
16.	Give the type of External frequency compensation in op-amp.	**CO1**	**BTL-1**	**Remember**
17.	Define Input bias current	**CO1**	**BTL-1**	**Remember**
18.	Define CMRR.	**CO1**	**BTL-1**	**Remember**

19.	Define Slew rate	**CO1**	**BTL-1**	**Remember**
20.	What happens when the common terminal of V+ and V- sources are not grounded?	**CO1**	**BTL-2**	**Understand**
21.	A 100 pF capacitor has a maximum charging current of 100 micro amps. Calculate its slew rate.	**CO1**	**BTL-2**	**Understand**
22.	Draw the circuit diagram of a symmetrical emitter coupled differential amplifier.	**CO1**	**BTL-1**	**Remember**
23.	Why IC 741 is not used for high frequency applications?	**CO1**	**BTL-2**	**Understand**
24.	What is the maximum undistorted sine-wave that can be obtained for a 10 V peak and 1V peak, if the slew rate of an op-amp is 0.6 V/micro sec?	**CO1**	**BTL-2**	**Understand**
	PART– B			
1.	Construct a typical transistor from the fabrication techniques of monolithic ICs and briefly explain the process involved in it. **(16)**	**CO1**	**BTL-4**	**Analyze**
2.	**(i)** What is thin and thick film technology? **(4)**	**CO1**	**BTL-3**	**Apply**
	(ii) Describe the various methods used for deposition of thin film technology.**(12)**	**CO1**	**BTL-3**	**Apply**
3.	Discuss in detail about diffusion and ion implantation process in IC fabrication. **(16)**	**CO1**	**BTL-3**	**Apply**
4.	Describe the functions of all the basic building blocks of an Op-Amp. **(16)**	**CO1**	**BTL-3**	**Apply**
5.	List the six characteristics of an ideal op-amp and explain in detail and give the practical op-amp equivalent circuit. **(16)**	**CO1**	**BTL-4**	**Analyze**
6.	Discuss in detail about the DC characteristics of Op-Amp. **(16)**	**CO1**	**BTL-4**	**Analyze**
7.	Explain about the ideal Op-Amp characteristics. **(16)**	**CO1**	**BTL-4**	**Analyze**
8.	Draw and explain the working principle symmetrical emitter coupled differential amplifier and derive for CMRR. **(16)**	**CO1**	**BTL-3**	**Apply**
9.	Discuss in detail about the DC and AC characteristics of Op-Amp. **(16)**	**CO1**	**BTL-3**	**Apply**
10.	**(i)** What is input and output voltage and current offset? How are they compensated? **(9)** **(ii)** With a neat diagram derive the AC performance close loop characteristics of Op-amp to discuss on the circuit Bandwidth, Frequency response and slew rate. **(7)**	**CO1**	**BTL-4**	**Analyze**
11.	Determine the frequency response characteristics of an operational amplifier. **(16)**	**CO1**	**BTL-3**	**Apply**
12.	How common mode rejection ratio can be increased using constant	**CO1**	**BTL-3**	**Apply**

	current source? **(16)**				
13.	**(i)**	Write a note on stability criterion applicable to op-amp circuit **(4)**	**CO1**	**BTL-4**	**Analyze**
	(ii)	Explain in detail about the methods of frequency compensation used in operational amplifiers. **(12)**	**CO1**	**BTL-4**	**Analyze**
14.	Explain the following terms in an op-amp		**CO1**	**BTL-4**	**Analyze**
	(i)	Bias current. **(4)**	**CO1**	**BTL-3**	**Apply**
	(ii)	Thermal drift. **(4)**	**CO1**	**BTL-3**	**Apply**
	(iii)	Input offset voltage and current. **(4)**	**CO1**	**BTL-3**	**Apply**
	(iv)	Virtual ground. **(4)**	**CO1**	**BTL-3**	**Apply**
15.	**(i)** Determine the frequency response characteristics of an operational amplifier. **(9)**		**CO1**	**BTL-4**	**Analyze**
	(ii) How common mode rejection ratio can be increased using constant current source? **(7)**		**CO1**	**BTL-4**	**Analyze**
16.	**(i)** Write a note on stability criterion applicable to op- amp circuit. **(4)** **(ii)** Explain in detail about the methods of frequency compensation used in operational amplifiers. **(12)**		**CO1**	**BTL-3**	**Apply**
17.	**(i)** What is Slew rate? Analyze the causes of slew rate and explain its significance in applications. **(10)**		**CO1**	**BTL-4**	**Analyze**
	(ii) How slew rate can be improved? **(6)**		**CO1**	**BTL-4**	**Analyze**

UNIT II APPLICATIONS OF OPAMP

Basic operation of Inverting and Non Inverting amplifiers, Voltage follower, Adder, Subtractor, Integrator, Differentiator, Instrumentation amplifier and its applications for transducer Bridge, Differential amplifier, Voltage to current and Current to voltage converters, clippers, clampers, peak detector, Precision rectifier, Sample and hold circuits.

1.	Draw the circuit diagram of Non inverting amplfier	**CO2**	**BTL-1**	**Remember**
2.	State the gain of the Inverting amplifier	**CO2**	**BTL-1**	**Remember**
3.	What is meant by inverting amplifier ?	**CO2**	**BTL-1**	**Remember**
4.	Give the schematic of Unity follower	**CO2**	**BTL-1**	**Remember**
5.	How an op-amp can be used as a voltage follower?	**CO2**	**BTL-2**	**Understand**
6.	Draw the circuit diagram of Non inverting summer.	**CO2**	**BTL-1**	**Remember**
7.	Sketch the integrator using Op-amp	**CO2**	**BTL-1**	**Remember**
8.	Illustrate some of the important features of an instrumentation amplifier.	**CO2**	**BTL-2**	**Understand**
9.	What are the basic requirements of a good instrumentation amplifier?	**CO2**	**BTL-1**	**Remember**
10.	Summarize the applications of an instrumentation amplifier.	**CO2**	**BTL-1**	**Remember**
11.	What is the need for converting a first order filter into a second order filter?	**CO2**	**BTL-1**	**Remember**
12.	Write the advantages & disadvantages of passive filters?	**CO2**	**BTL-1**	**Remember**
13.	Why active filters are preferred over passive filters?	**CO2**	**BTL-2**	**Understand**

14.	Define comparator and function of a phase shift circuit ?	**CO2**	**BTL-1**	**Remember**
15.	Draw the circuit diagram of differentiator using Op-amp.	**CO2**	**BTL-1**	**Remember**
16.	What is a V to I convertor?	**CO2**	**BTL-1**	**Remember**
17.	What is an I to V convertor?	**CO2**	**BTL-1**	**Remember**
18.	Summarize the difference between active clipper and passive clipper.	**CO2**	**BTL-2**	**Understand**
19.	Infer the advantage of using active clipper over passive clipper?	**CO2**	**BTL-2**	**Understand**
20.	Write any two applications of clipper and clamper.	**CO2**	**BTL-1**	**Remember**
21.	Draw a peak detector circuit using op-amp. Give the applications of peak detectors	**CO2**	**BTL-1**	**Remember**
22.	How a precision rectifier using op-amp is superior to a conventional rectifier?	**CO2**	**BTL-2**	**Understand**
23.	What is sample and hold circuit? Point out where it is used? Why?	**CO2**	**BTL-1**	**Remember**
24.	Draw the diagram of sample and hold circuit.	**CO2**	**BTL-1**	**Remember**
	PART– B			
1.	**(i)** Draw the inverting amplifier circuit and non-inverting amplifier circuit of an op-amp in closed loop configuration. Obtain the expression for the closed loop gain for both amplifiers. **(12)**	**CO2**	**BTL-4**	**Analyze**
	(ii) For a non-inverting amplifier using an op-amp assume Ri = 470Ω and Rf = 4.7kΩ. Calculate the closed loop voltage gain of the amplifier. **(4)**	**CO2**	**BTL-4**	**Analyze**
2.	Explain the application of op-amp as adder and Subtractor. **(16)**	**CO2**	**BTL-4**	**Analyze**
3.	Deduce an op-amp circuit to give an output voltage $V_0 = 4V_1 - 3V_2 + 5V_3 - V_4$, Where V_1, V_2, V_3 and V_4 are inputs. **(16)**	**CO2**	**BTL-3**	**Apply**
4.	Compare and contrast Adder, Subtractor circuit using op-amp with equations. **(16)**	**CO2**	**BTL-3**	**Apply**
5.	Explain about the differentiator circuit and draw the frequency response for the same. **(16)**	**CO2**	**BTL-4**	**Analyze**
6.	Design a differentiator circuit and draw the frequency response for the same. **(16)**	**CO2**	**BTL-3**	**Apply**
7.	Explain the application of Instrumentation for transducer bridge circuit. **(16)**	**CO2**	**BTL-4**	**Analyze**
8.	Explain AD623 Instrumentation amplifier IC with neat sketch. **(16)**	**CO2**	**BTL-4**	**Analyze**
9.	Sketch an instrumentation amplifier using 3 Op-Amp and derive its output voltage equation. **(16)**	**CO2**	**BTL-4**	**Analyze**
10.	Explain the differential amplifier using Op-Amp. **(16)**	**CO2**	**BTL-3**	**Apply**
11.	Draw and explain the operation of a current to voltage converter. **(16)**	**CO2**	**BTL-4**	**Analyze**
12.	With diagram explain the working principle of V/I converter. **(16)**	**CO2**	**BTL-4**	**Analyze**

13.	Design a circuit of a clipper which will clip the input signal below a reference voltage. **(16)**	**CO2**	**BTL-4**	**Analyze**
14.	**(i)** Explain the application of op-amp as clamper circuit. **(9)** **(ii)** With neat sketch explain the operation of triangular waveform generator using op-amp.**(7)**	**CO2**	**BTL-4**	**Analyze**
15.	**(i)** Discuss about sample and hold circuit and explain its operation. **(9)** **(ii)** Design a circuit of a clipper which will clip the input signal below a reference voltage. **(7)**	**CO2**	**BTL-3**	**Apply**
16.	**(i)** Describe how an Op-Amp will be used as Peak detector. **(6)**	**CO1**	**BTL-3**	**Apply**
	(ii) Explain about Precision rectifier **(10)**	**CO1**	**BTL-3**	**Apply**
17.	Discuss about sample and hold circuit and explain its operation.(**16)**	**CO2**	**BTL-4**	**Analyze**

UNIT III COMPARATORS AND WAVEFORM GENERATORS

Analog multiplier & Divider, first and second order active filters, Basic operation and applications of Comparator, Schmitt trigger, waveform generators, ICL 8038 function generator IC, Monostable, Astable and Bistable Multivibrators, Log and Antilog amplifier.

PART – A

Q.No	Questions	COs	BT Level	Competence
1.	What is analog multiplier?	**CO3**	**BTL-1**	**Remember**
2.	Mention the few applications of analog multiplier.	**CO3**	**BTL-2**	**Understand**
3.	Define analog multiplier?	**CO3**	**BTL-1**	**Remember**
4.	State any two multiplier ICs	**CO3**	**BTL-1**	**Remember**
5.	Point out the application of analog multipliers.	**CO3**	**BTL-1**	**Remember**
6.	List the performance parameters of the multiplier	**CO3**	**BTL-1**	**Remember**
7.	Why active filters are preferred over passive filters?	**CO3**	**BTL-2**	**Understand**
8.	List the applications of comparators.	**CO3**	**BTL-1**	**Remember**
9.	Draw the circuit diagram of a squaring circuit using multiplier.	**CO3**	**BTL-1**	**Remember**
10.	What is a Zero crossing detector?	**CO3**	**BTL-1**	**Remember**
11.	Sketch the circuit of an op-amp employed as a non-inverting zero crossing detector, along with input and output waveforms.	**CO3**	**BTL-2**	**Understand**
12.	Write the function of Schmit trigger.	**CO3**	**BTL-1**	**Remember**
13.	Point out any two application of 555 Timer in Mono stable mode.	**CO3**	**BTL-2**	**Understand**
14.	Define duty cycle in astable multivibrator using IC 555.	**CO3**	**BTL-1**	**Remember**
15.	List the application of Astable multivibrator	**CO3**	**BTL-1**	**Remember**
16.	Give the details of function generator ICs	**CO3**	**BTL-1**	**Remember**

17.	What is meant by monostable multivibrator	**CO3**	**BTL-1**	**Remember**
18.	Define Astable Multivibrator	**CO3**	**BTL-2**	**Understand**
19.	Write the working principles of Bistable multivibrator	**CO3**	**BTL-2**	**Understand**
20.	Write the applications of multivibrator.	**CO3**	**BTL-1**	**Remember**
21.	State the applications of log amplifier.	**CO3**	**BTL-1**	**Remember**
22.	Draw the circuit of a log amplifier using two opamps.	**CO3**	**BTL-1**	**Remember**
23.	Give the use of log amplifier	**CO3**	**BTL-1**	**Remember**
24.	Draw the circuit of antilog amplifier using op-amp.	**CO3**	**BTL-1**	**Remember**
PART – B				
1.	Derive the expression for the analog multiplier and divider with necessary diagrams.**(16)**	**CO3**	**BTL-3**	**Apply**
2.	Describe the working principle of the variable trans-conductance analog multiplier.**(16)**	**CO3**	**BTL-4**	**Analyze**
3.	Explain the process of frequency doubler using analog multiplier with necessary equations. **(16)**	**CO3**	**BTL-4**	**Analyze**
4.	Summarize the following application of Multiplier with necessary diagram and equations. **(i)** Phase angle detection **(8)** **(ii)** RMS detector **(8)**	**CO3**	**BTL-3**	**Apply**
5.	Explain the various operation of AD533 analog multiplier IC. **(16)**	**CO3**	**BTL-4**	**Analyze**
6.	Explain the first order low pass filter with neat diagram. Derive its frequency response and plot the same.**(16)**	**CO3**	**BTL-3**	**Apply**
7.	Draw and explain the circuit of a second order low pass filter and derive its transfer function. **(16)**	**CO3**	**BTL-3**	**Apply**
8.	What is a comparator? With neat circuit diagram Explain its types. **(16)**	**CO3**	**BTL-3**	**Apply**
9.	With neat circuit diagram explain the working of Schmitt trigger using op-amp. **(16)**	**CO3**	**BTL-4**	**Analyze**
10.	Explain about ICL 8038 Function Generator IC. **(16)**	**CO3**	**BTL-3**	**Apply**
11.	Describe about the generation of triangular wave generation using Op-amps. **(16)**	**CO3**	**BTL-4**	**Analyze**
12.	For the astable circuit, derive the expression for high state time interval, low state time interval, period, frequency and duty cycle. **(16)**	**CO3**	**BTL-3**	**Apply**
13.	Discuss Monostable multivibrators in detail with neat sketches. **(16)**	**CO3**	**BTL-4**	**Analyze**
14.	Describe the operation of a bistable multivibrator using Op-amp with necessary waveforms.**(16)**	**CO3**	**BTL-4**	**Analyze**
15.	Explain the astable operation of Op-amp with necessary waveforms. **(16)**	**CO3**	**BTL-3**	**Apply**

16.	In Astable multivibrator using 555 timer R_a=2.2 KΩ, R_b=6.8KΩ and C=0.01μF. Calculate T_{high}, T_{low}, free running frequency and duty cycle.**(16)**	**CO3**	**BTL-4**	**Analyze**
17.	Write a note on log and antilog amplifiers using op-amp.**(16)**	**CO3**	**BTL-4**	**Analyze**

UNIT IV SIGNAL CONVERTERS

Need for D-A&A – D converter, D-A converter: Weighted resistor, R-2R ladder, and inverted R-2R types. A – D converter: Flash, Counter, Servo tracking, Successive approximation, Dual slope types. DAC and ADC performance characteristics, examples of ADC, DAC IC's.

PART – A

Q.No	Questions	COs	BT Level	Competence
1.	What are the specifications of D/A Converter	**CO4**	**BTL-1**	**Remember**
2.	An 8 bit DAC has an output voltage range of 0 to 2.55 V. find its resolution.	**CO4**	**BTL-2**	**Understand**
3.	Calculate the value of the LSB, MSB and full scale output for an 8 Bit DAC for the 0 to 12V range.	**CO4**	**BTL-2**	**Understand**
4.	How many resistors are required in a 12-bit weighted resistor DAC?	**CO4**	**BTL-2**	**Understand**
5.	What is meant by conversion time of DAC?	**CO4**	**BTL-1**	**Remember**
6.	Define the resolution of DAC converter.	**CO4**	**BTL-1**	**Remember**
7.	Find the resolution of the a 12 bit D/A converter	**CO4**	**BTL-1**	**Remember**
8.	Give the basic types of DAC.	**CO4**	**BTL-1**	**Remember**
9.	Define settling time of DAC.	**CO4**	**BTL-1**	**Remember**
10.	What are the drawbacks of binary weighted DAC?	**CO4**	**BTL-1**	**Remember**
11.	Point out the different parameters of the D/A and A/D converter given by the manufactures.	**CO4**	**BTL-1**	**Remember**
12.	Calculate the number of comparators required for realizing an 8 bit ADC.	**CO4**	**BTL-2**	**Understand**
13.	List the types of DACs and ADCs.	**CO4**	**BTL-1**	**Remember**
14.	What are current driven DACs	**CO4**	**BTL-2**	**Understand**
15.	Which is the fastest ADC? Why?	**CO4**	**BTL-2**	**Understand**
16.	Define conversion time of ADC	**CO4**	**BTL-1**	**Remember**
17.	List the basic A/D Conversion techniques.	**CO4**	**BTL-1**	**Remember**
18.	List the advantages of dual slope ADC	**CO4**	**BTL-1**	**Remember**
19.	Give the advanatges of integrating type ADC.	**CO4**	**BTL-2**	**Understand**
20.	A 10 bit A/D converter has an input voltage of -10 to +10V. Estimate resolution.	**CO4**	**BTL-2**	**Understand**
21.	What is meant by servo tracking A/D converter	**CO4**	**BTL-1**	**Remember**
22.	State the disadvantages of counter type	**CO4**	**BTL-1**	**Remember**
23.	How many clock periods are required for an 8 bit successive approximation ADC for a single conversion?	**CO4**	**BTL-2**	**Understand**

24.	Which type of ADC is used in all Digital voltmeter.	**CO4**	**BTL-2**	**Understand**
	PART – B			
1.	With neat sketch explain the working principle of weighted resistor DAC using Op-Amp. **(16)**	**CO4**	**BTL-4**	**Analyze**
2.	With neat circuit diagram, explain the operation of R-2R D/A converter.**(16)**	**CO4**	**BTL-3**	**Apply**
3.	Describe about the R-2R ladder DAC with necessary diagrams.**(16)**	**CO4**	**BTL-4**	**Analyze**
4.	Explain about the Inverted R-2R ladder DAC with necessary diagrams.**(16)**	**CO4**	**BTL-4**	**Analyze**
5.	Summarize about the following **(i)**Multiplying DAC **(5)** (**ii)**Monolithic DAC **(11)**	**CO4**	**BTL-3**	**Apply**
6.	Explain the operation of Flash type A/D converter with neat diagram . **(16)**	**CO4**	**BTL-4**	**Analyze**
7.	Describe about the parallel comparator A/D converter with necessary diagram. . **(16)**	**CO4**	**BTL-3**	**Apply**
8.	**(i)** Explain about the Counter type A/D converter with neat diagram.**(8)**	**CO4**	**BTL-4**	**Analyze**
	(ii) Summarize the servo tracking type A/D converter with neat diagram **.(8)**	**CO4**	**BTL-4**	**Analyze**
9.	**(i)** What are the advantages of continuous type A/D converter over counter type A/D converter? **(3)** **(ii)** Illustrate the working of successive approximation type A/D converter with a neat diagram. **(13)**	**CO4**	**BTL-3**	**Apply**
10.	**(i)** Explain the operation of dual slope ADC.**(9)** **(ii)** Explain the following characteristics of ADC resolution, accuracy, settling time, linearity. **(7)**	**CO4**	**BTL-3**	**Apply**
11.	Explain the operation of dual slope ADC with necessary diagram . **(16)** .	**CO4**	**BTL-4**	**Analyze**
12.	Illustrate the working of successive approximation type A/D converter with a neat diagram. **(16)**	**CO4**	**BTL-3**	**Apply**
13.	Compare and contrast various types of ADCs. **(16)**	**CO4**	**BTL-4**	**Analyze**
14.	**(i)** Summarize about Charge balancing ADC.**(8)**	**CO4**	**BTL-4**	**Analyze**
	(ii) Describe neatly the Dual slope Integrating type ADC. **(8)**	**CO4**	**BTL-4**	**Analyze**
15.	Explain the following characteristics of ADC resolution, accuracy, settling time, linearity. **(16)**	**CO4**	**BTL-3**	**Apply**

16.	Summarize about the DAC and ADC performance characteristics. **(16)**	**CO4**	**BTL-4**	**Analyze**
17.	With neat diagram explain about the examples of ADC and DC Ic's. **(16)**	**CO4**	**BTL-3**	**Apply**

UNIT V SPECIAL ICs

Functional block, characteristics of 555 Timer and its PWM application - IC-566 voltage controlled oscillator IC; 565-phase locked loop IC, IC voltage regulators – LM78XX, LM79XX; Fixed voltage regulators its application as Linear power supply - LM317, 723 Variable voltage regulators, switching regulator- SMPS.

PART – A

Q.No	Questions	COs	BT Level	Competence
1.	Write the important features of 555 timer circuit.	**CO3**	**BTL-1**	**Remember**
2.	Draw the functional block of 555 timer IC.	**CO3**	**BTL-1**	**Remember**
3.	In what way VCO is different from other oscillators?	**CO3**	**BTL-2**	**Understand**
4.	Why VCO is called voltage to frequency converter?	**CO3**	**BTL-2**	**Understand**
5.	With reference to a VCO, summarize voltage to frequency conversion factor Kv.	**CO3**	**BTL-2**	**Understand**
6.	Define PLL.	**CO3**	**BTL-1**	**Remember**
7.	List the applications of PLL.	**CO3**	**BTL-1**	**Remember**
8.	Give the applications of NE565.	**CO3**	**BTL-1**	**Remember**
9.	What are the applications of fixed voltage regulator?	**CO4**	**BTL-1**	**Remember**
10.	List two application of isolation amplifier.	**CO4**	**BTL-1**	**Remember**
11.	Define load regulation and line regulation.	**CO4**	**BTL-1**	**Remember**
12.	Write the ripple rejection with respect to voltage regulators.	**CO4**	**BTL-1**	**Remember**
13.	What are the drawbacks of simple current limiting and how is it overcome?	**CO4**	**BTL-1**	**Remember**
14.	What is the need for current limiting in regulated power supplies?	**CO4**	**BTL-2**	**Understand**
15.	Compare switching regulator and variable voltage regulator.	**CO4**	**BTL-2**	**Understand**
16.	What is the important performance parameters of 3 terminal IC regulators?	**CO4**	**BTL-2**	**Understand**
17.	What are the limitations of three terminal regulator?	**CO4**	**BTL-1**	**Remember**
18.	Differentiate between linear and switching regulators.	**CO4**	**BTL-2**	**Understand**
19.	What is the need for protection diodes in voltage regulators based on LM317 regulator?	**CO4**	**BTL-1**	**Remember**
20.	Write the expression for output voltage in LM317.	**CO4**	**BTL-1**	**Remember**
21.	Draw the pin diagram of IC 723 regulator.	**CO4**	**BTL-1**	**Remember**
22.	How current boosting is achieved in a 723 IC?	**CO4**	**BTL-2**	**Understand**
23.	What is SMPS?	**CO4**	**BTL-1**	**Remember**
24.	Why do switching regulators have better efficiency than the series regulator?	**CO4**	**BTL-2**	**Understand**

	PART – B			
1.	**(i)** Discuss the functional diagram of 555 timer and explain in detail.**(9)** **(ii)** Discuss the operation of PWM using 555 timer. **(7)**	**CO5**	**BTL-4**	**Analyze**
2.	Derive, design and draw the waveform of a 1 kHz square wave generator using 555 timer for duty cycle of 50% .**(16)**	**CO5**	**BTL-3**	**Apply**
3.	With the help of schematic diagram, explain the operation of IC-566. Also derive an expression for the output frequency. **(16)**	**CO5**	**BTL-3**	**Apply**
4.	Describe the block diagram of a VCO and explain its operation. **(16)**	**CO5**	**BTL-3**	**Apply**
5.	Explain the working of PLL using appropriate block diagram and analyze how it can be used as frequency translator.**(16)**	**CO5**	**BTL-4**	**Analyze**
6.	**(i)** Explain functional block diagram of NE565 phase locked loop. **(9)** **(ii)** Narrate the process of PLL as a frequency divider. **(7)**	**CO5**	**BTL-3**	**Apply**
7.	Evaluate the various phases in the operation of a PLL.**(16)**	**CO5**	**BTL-4**	**Analyze**
8.	Briefly explain the functional block diagram of NE565 PLL IC to operate.**(16)**	**CO5**	**BTL-3**	**Apply**
9.	With block diagram explain the principle of operation of NE565.**(16)**	**CO5**	**BTL-3**	**Apply**
10.	Explain the working principle of basic linear voltage regulator using op-amp. **(16)**	**CO5**	**BTL-4**	**Analyze**
11.	Explain the operation of LM78XX fixed voltage regulator with necessary diagram. **(16)**	**CO5**	**BTL-3**	**Apply**
12.	Explain the operation of LM79XX fixed voltage regulator with necessary diagram. **(16)**	**CO5**	**BTL-3**	**Apply**
13.	Write short notes on **(i)** LM 317 Voltage Regulator.**(7)** **(ii)** Series voltage regulator **(9)**	**CO5**	**BTL-4**	**Analyze**
14.	**(i)** Discuss about the functional diagram of 723 IC regulator in detail. **(9)** **(ii)** Explain the fold back characteristics of 723 IC regulator. **(7)**	**CO5**	**BTL-4**	**Analyze**
15.	Write a detailed note on switching regulators. **(16)**	**CO5**	**BTL-3**	**Apply**
16.	With neat diagram, explain the working of step down switching regulator. **(16)**	**CO5**	**BTL-4**	**Analyze**
17.	Briefly explain the switched mode power supply with necessary circuit diagrams and waveforms. **(16)**	**CO5**	**BTL-4**	**Analyze**